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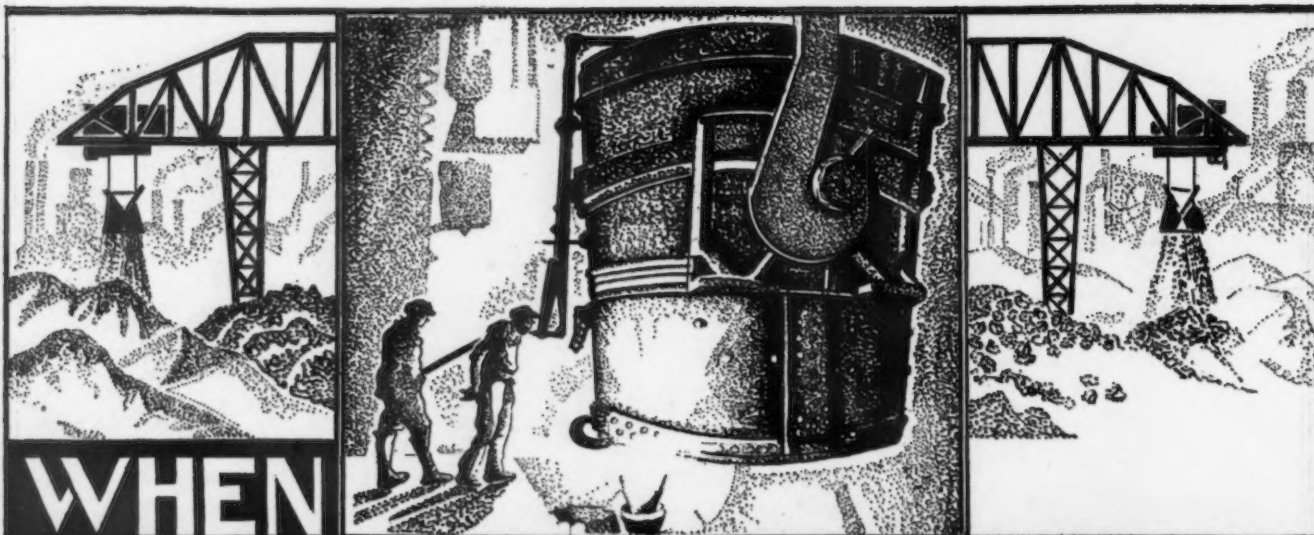
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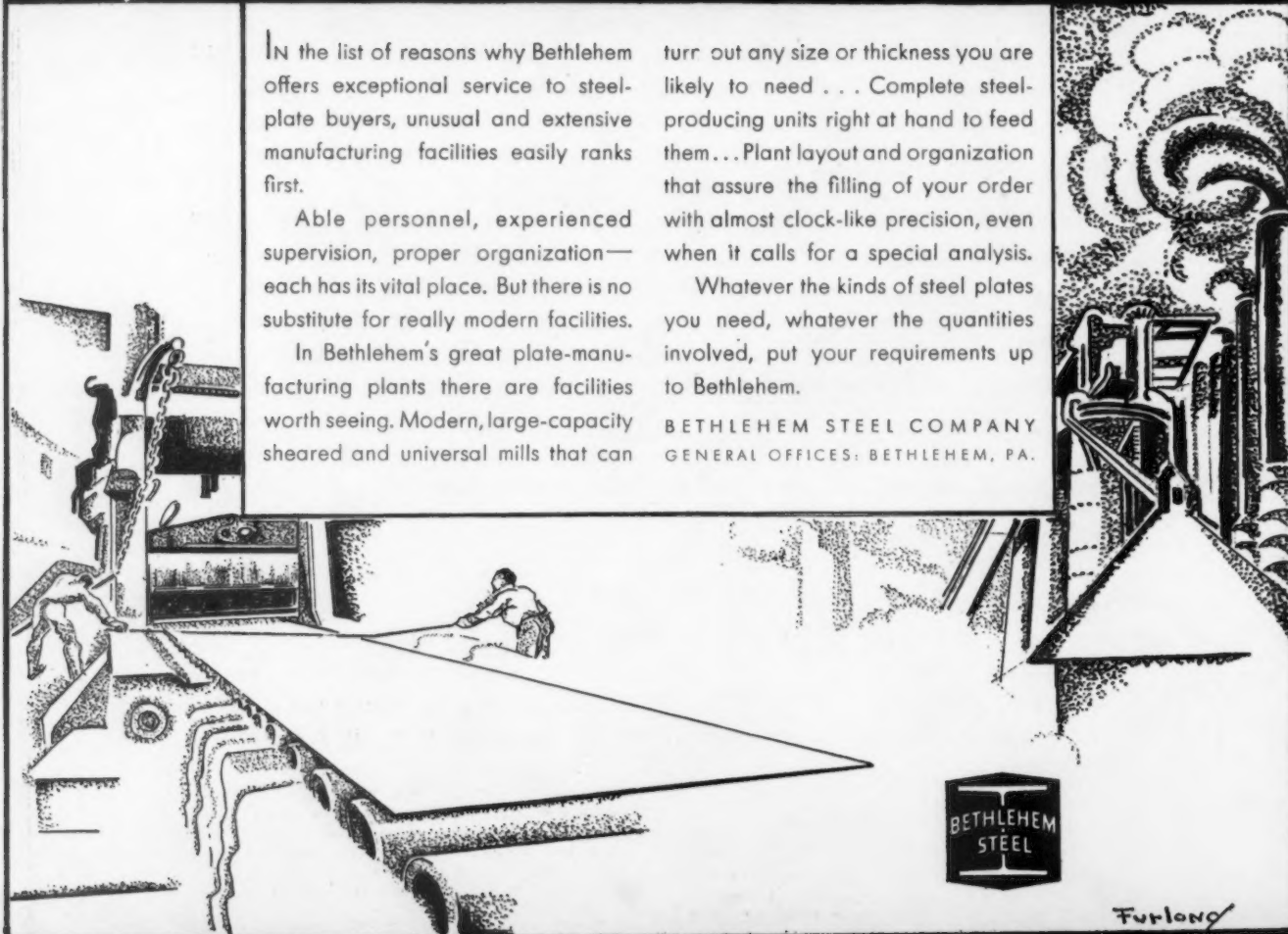
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No Free Rides

A MONTH ago, industrial sentiment was almost unanimous in its support of the President's plan for Industry Control. The majority of us realized that something had to be done, and done quickly, to reverse the devastating action of the vicious spiral.

Sentiment on this subject among employers, today, is divided. This is partly because business has been improving. But it is principally because of the obvious efforts of "organized" labor to use the terms of the Recovery Act as a means of securing an advantaged position for a class minority.

That this attempt is vigorously being made is now quite evident. It is apparent in Detroit, for example, where the A. F. of L. is now conducting a whirlwind unionizing

campaign. It is also evident in the coal districts, in the steel-producing districts and elsewhere. Organizers have even gone so far as to insert advertisements in newspapers in labor districts which imply that the Recovery Act makes it compulsory to join "the union."

Of course, this has been disturbing to employers in open shop districts, who comprise the large majority of all employers and who have maintained fair and friendly relations with their help. Quite naturally, they wish to continue to get along without the interference of professional "disturbers" and to keep their localities free from the extortions of labor racketeers.

The natural inclination of the employer, who is asked to carry the burden of wage



increases and of shortened working weeks, without being permitted to raise prices, is understandable in view of what is going on. It is to "stop, look and listen" before he agrees to sign what may well be a "revocation of independence" in favor of Mr. Green and his fellow "organizers."

That is one way to look at the situation. But there is another way.

The President did not write the objectionable features of the labor clause of this act. That was done by those legislators who listen attentively and respectfully to the dictates of the labor lobby.

Congress will not administer this act. The President will. And he is not likely to let any minority interest stand in the way of the desired end. That end is not to close-shop American industry, but to effect a better alinement between purchasing power and production.

The great majority of American people in all classes of life believe, with the President, that it is essential to attain this balance between producing capacity and consuming power. They, too, will not

tolerate the jeopardizing of these ends by any minority.

Organized labor is but a small fraction of our working population and a still smaller fraction of our public. It is more important politically than it is socially or from an economic standpoint. It is a little fellow with a loud voice.

This little fellow is now trying to increase his stature by climbing on the load that Uncle Sam with the help of capital and real labor is struggling to lift from the backs of the public.

It would be advisable to tell this little fellow in no uncertain terms that he had best climb down and do his share of the lifting. For industry cannot be expected to enthusiastically strain its back in order to give an aggressive and unpopular minority a free ride.

Organized labor cannot help either the President or the public by fomenting discord through the exercise of selfish opportunism. On the contrary, such action may easily defeat the common cause.

?

"THE employer is as free to make non-membership in a union a condition of employment as the working man is free to join the union. This is part of the constitutional rights of personal liberty and private property not to be taken away even by legislation. . . . The same liberty which enables men to form unions, and through the unions to enter into agreement with employers willing to agree, enables other men to remain independent of the union and other employers to agree with them to employ no man who owes allegiance or obligation to the union."

[From decision of
the U. S. Supreme
Court, Dec. 10, 1917,
in the *Hitchman
Coal & Coke Case.*]



Modern Metallurgy—A Factor in the Jobbing Iron Foundry

UNTIL recent years, the task of a jobbing gray iron foundry was simple. Usually some standard mixes of irons were used that seemed to make good looking castings, that machined easily, and that gave a reasonably good machine surface. With slight modifications, these standard mixes were generally employed and the iron was used rather promiscuously in all classifications of castings. That was the jobbing iron foundry practice of yesterday—yet this policy is still followed, unfortunately, by the majority of foundrymen today. Therefore, this slow improvement establishes an opportunity for those foundrymen who can appreciate the changes that have taken place in recent years, and who appreciate that the service conditions of castings should be considered and that modern metallurgy should be used to make castings to meet these conditions most efficiently.

For the same reason, those engaged in the jobbing iron casting business who are among the first to thoroughly understand the basic metallurgical factors involved and the proper use of alloys in castings can even under today's economic conditions consistently improve their business by both expanding their markets and bettering their sales prices.

Some jobbing foundries are working out their economic problems by concentrating on these possibilities. For example:

Allowing for all special expenses connected with alloyed irons and special irons and then deducting these as allowances against sales price, the basic sales price of the Fulton Foundry & Machine Co. is today considerably higher than it was in 1929—even though many expenses of labor and material have been much reduced since that time.

And further, the volume of business is much higher than the normal to be expected from the general business foundry index figures, and the number of customers has more than doubled since 1929. This is evidence that the intelligent, thoroughly understood application of modern metallurgy to the production of gray iron castings in jobbing work will pay.

Heat-Resistant Work

To examine this proposition more in detail, consider heat-resistant castings for stoker parts, lead pots, damper plates, heat-treating equipment, etc. The hit and miss castings of former days may work fairly well and then again they may fail miser-

By A. C. DENISON
President, Fulton Foundry & Machine Co.,
Cleveland

ably. A highly graphitized iron will grow and become rotten very rapidly. A better general-purpose iron with fairly good combined carbon will soon dissociate if certain stabilizing influences or alloys are not present. Consequently, it is a good investment to any buyer of castings who has heat-resistant requirements to pay more for a dependable product with definite properties which will regularly give long-service life. Likewise, it is an

ONE way to increase sales is to improve one's product. The jobbing iron foundry has an opportunity to raise the quality of its castings by the practical application of metallurgy and the exercise of care in melting. The author, himself a foundryman, does not advocate piling up expense through sharply increased purchases of expensive alloys. Such alloys have their place, he states, but they are no more important than some of the cheaper alloys in promoting the practical solution of day-to-day melting problems.

opportunity to any jobbing foundryman to study, both by reading and experimental research, the proper metallurgical combinations which will definitely meet reasonable heat conditions, and to know what may be expected from iron in this use. Many alloy combinations are possible for reasonable heat resistance, such as the use of special pig irons, nickel and chromium combinations, molybdenum and molybdenum-chromium combinations—and others. Much information is available to those who will search for it and much is offered by manufacturers of alloys as a result of their researches performed to further the sales of their products.

Brake drums offer the iron foundryman a field of opportunity, as shown by the quite general trend this year

back to cast iron brake drums by automobile builders.

The right cast iron makes an excellent brake drum, but many ordinary irons generally used in jobbing foundries make drums that not only will not stand up in service but may even be unsafe. The requirement of good brake drums is a cast iron of high strength with structure that is pearlitic and sorbo-pearlitic. It should be reasonably stable against dissociation when the drum is heated up in service, and the graphite should be in small particles and well distributed. These conditions can easily and consistently be met with good standardized melting practice and the proper use of alloys, so as to meet the needs of brake drums.

On industrial machinery, good cast iron brake drums should serve very efficiently and replace other materials now in use for these purposes by showing superior service records. Low-carbon cast iron with any of a number of alloy combinations that are available, when intelligently used, will make good dependable brake drums—well worth the better price needed to restore profits to the jobbing iron foundries.

Heat-resistant castings and brake drum castings illustrate several classifications which the jobbing foundryman should consider from a scientific standpoint. The list could be greatly extended to include pressure castings, wear-resistant castings, gears, castings requiring strength with a maximum deflection, and many other classifications.

Skilled Melting Essential

To meet the requirements of today it is necessary to have skilled melting regardless of the melting medium. Good results can be obtained with the cupola, air furnace or electric furnace under skilled management but poor iron will also be produced with any of these melting mediums under careless control. Therefore it behooves the progressive jobbing foundryman to establish by research the exact condition under which his furnace or cupola gives best results, and then set up standard inspection requirements that must be met every day to maintain uniform melting.

Likewise, the jobbing foundryman who is to meet these more exacting requirements of cast iron cannot ex-

(Concluded on Page 68)

Welding in the Steel Industry—

Heavy Equipment Applications

PREVIOUS articles in this series dealt with the use of welded steel construction for various mill parts. Applications were grouped according to their use in mill operation. This article will consider unrelated types of equipment which have but one thing in common, namely, heavy stresses and strains that provide exceptionally severe tests of welded construction.

First let us consider a lifting ram for a soaking pit crane. The one shown in Fig. 1 was built to replace a cast-steel lifting ram for a 15-ton soaking pit crane in which fractures had developed in the ribs and supports. The entire ram was made up of 1-in. plates and fabricated with the

By C. M. TAYLOR
Vice-President, Lincoln Electric Co., Cleveland

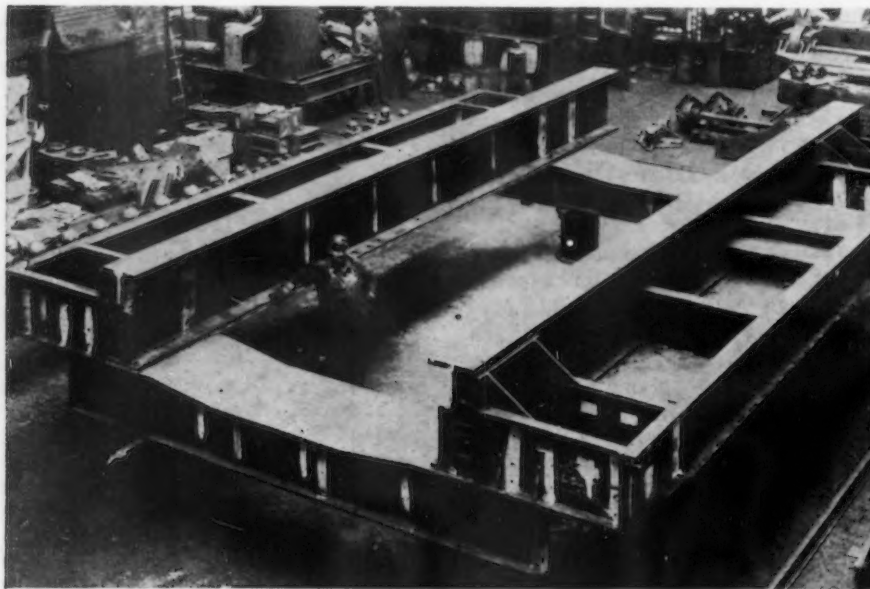
with a torch to approximately the outside diameter of the pipe; the end-plates were then put on the pipe and tack welded in place. This was repeated with all other plates. Next the longitudinal plates were set in and tack welded, then the guide bars and the flange collar on the end. It was then decided that the ram should be annealed, after which the welding was completed. The annealing was necessary because of the excessive stresses set up by the intricate design.

This ram has been in operation for over a year and has seen almost constant service without repairs. The cost of fabrication was much less per pound of fabricated steel used than that of the original steel casting.

Roll-Changing Hook Handles 60-Ton Loads

The 12-ton roll-changing hook shown in Fig. 2 was built at the Riverside Works of the Otis Steel Co., Cleveland. This hook is in daily use lifting loads weighing up to 60 tons.

In designing for steel construction, heavy plate was used and the hook built in the form of a U-section. The length from end to end is approximately 30 ft. The side plates consist of two lengths of 1½ in. plate with strapped butt joints on the inner



aid of a cutting torch and the electric arc welding process. The four corners are made up of 4 x 4-in. forgings welded in place, machined, and provided with flat strips held on with countersunk bolts. This construction was necessary because the strips have to be renewed due to wear as the ram travels up and down in the guides in lifting the ingots out of the soaking pits.

The steel pipe in the center was rolled in two 7-ft. sections and welded circumferentially and longitudinally, making a piece of pipe 14 ft. 1½ in. long, 25 in. outside diameter, and 1 in. thick. After the pipe had been welded a hole was cut out of the end plates

FIG. 4.—Girders attached to end carriages in the process of shop assembly. A 36-in. H-beam forms the heavy section of the girder.

▲ ▲ ▲

FIG. 2.—(At Right) Welded roll-changing hook 30-ft. long; it handles loads up to 60 tons. A steel casting welded to the hook at the lower end fits over the shaft of the roll to be lifted.



THIS article covers application of welding to a soaking-pit-crane lifting ram, a roll-changing hook and an open-hearth charging machine which, because of the heavy stresses, provide unusually severe tests of welded construction. It is the third in a series by Mr. Taylor. The previous articles, devoted respectively to table and furnace rollers and to tilting and transfer tables, mill shoes and other parts of steel mill machinery, appeared in *THE IRON AGE* of April 20, page 620, and June 29, page 1024.

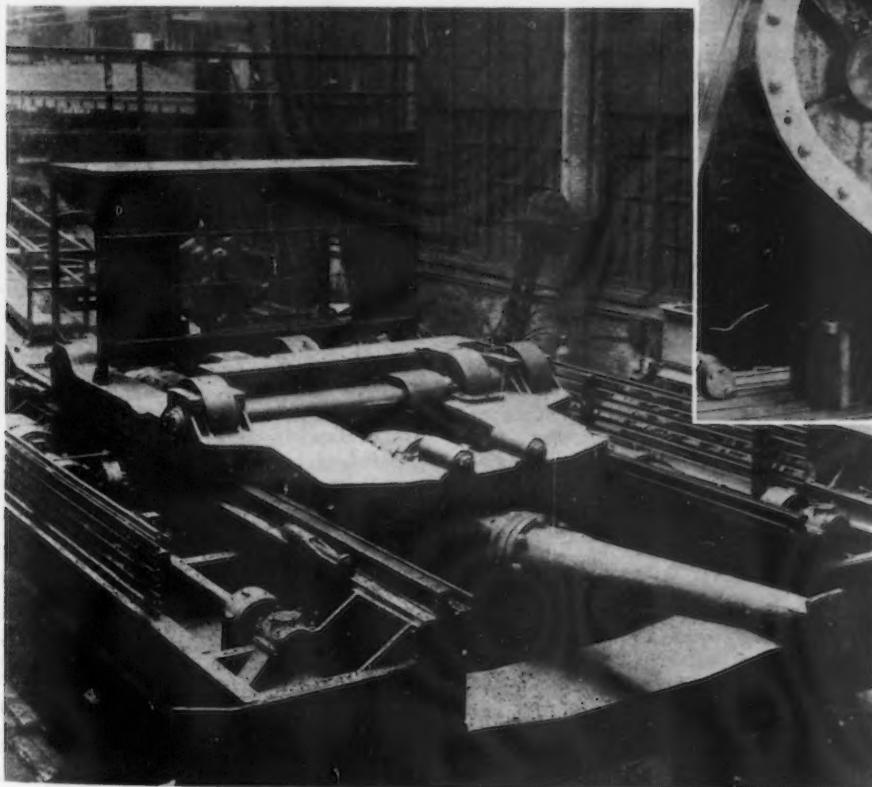
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sides. The cover plate is built of two lengths of $1\frac{3}{4}$ in. steel, 2 ft., 4 in. wide, with a strapped butt joint. A $\frac{3}{4}$ in. stiffening member was laid on top of the cover plate, extending the entire length of the curved section, and fillet welded in place on all sides.

A steel casting was welded to the hook at the lower end. This casting fits over the shaft of the roll to be lifted.

Open-Hearth Charging Machine Has Welded Members

As weaknesses of the old type open-hearth charging machines developed under the ever-increasing loads and service, the design was changed. Heavier sections of steel were used. The size of rivets increased and the spacing decreased to produce sections as rigid as possible. But there is a limit to the size rivets which can be used and to the rivet spacing. Fig. 3



shows the shop assembly of a welded $7\frac{1}{2}$ -ton capacity low type charging machine built by the Wellman Engineering Co. for the Carnegie Steel Co.

Fig. 4 shows the girders attached

FIG. 3. — (Below) Shop assembly of $7\frac{1}{2}$ -ton capacity charging machine. After erection of the chargers on the open-hearth platform, the end carriages were welded together. The bolts used to join the end carriages and girders were welded in place.

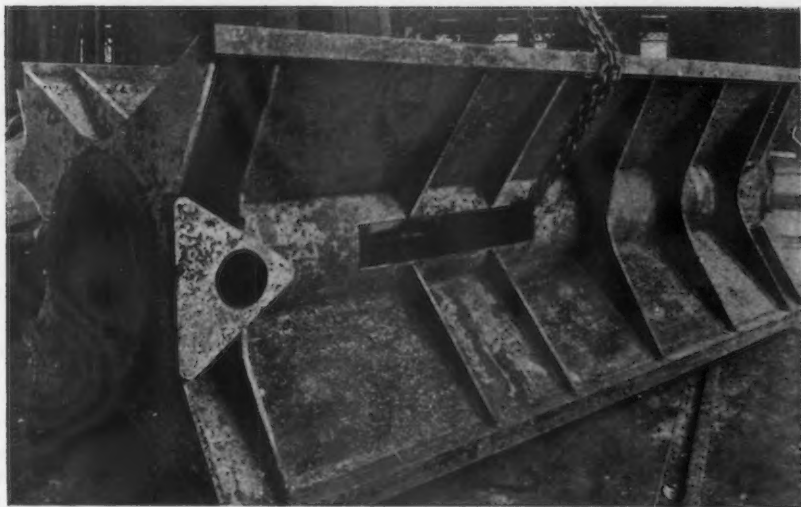


Fig. 1.—This lifting ram for a 15-ton soaking pit crane is made of 1-in. plates gas cut and arc welded. It has been in continuous operation for more than a year.

to the end carriages in the process of shop assembly. A 36-in. H-beam forms the heavy section of the girder. The outer section is a 20-in. I-beam with both beams welded to a bottom cover plate. Vertical stiffening mem-

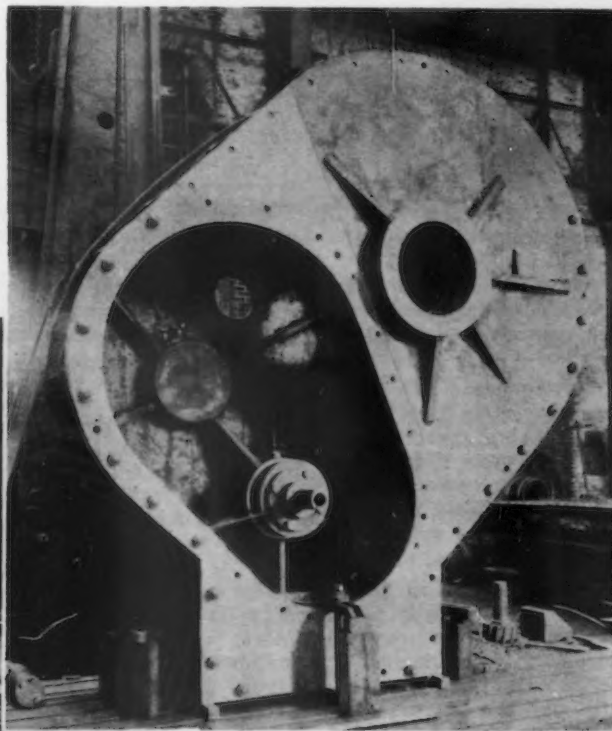


Fig. 5.—Special 16-ton gear case featuring oil-tight welded construction. Side plates are $1\frac{1}{2}$ -in. thick and cover plates, 2-in. thick.

bers are welded to the H-beam. The cross members for supporting the moving mechanism were planed to assure alinement of the shafting.

Following erection of the chargers on the open-hearth platform the end carriages were welded together. Even
(Concluded on Page 68)

Gear Lapping After Heat Treatment

By R. S. DRUMMOND

President, National Broach & Machine Co.
Detroit

THE technique of gear cutting has never progressed to the point where the desired accuracy for certain types of units could be consistently attained without subsequent correcting operations.

The patent office has a large accumulation of ideas and devices for

the performance of the gears, but in the light of present standards it was a crude method for correcting the many inaccuracies to which gears are subject. One of the chief difficulties results from the occurrence of high spots left by the cutting operation. When a gear having such high spots runs together with another gear, the high spots on the first wear holes in the teeth of the second.

It is also customary in this wear-in procedure to operate the gears on parallel axes. Obviously the distance

between the gears is a factor in the greatest development. Some have gone as far as to equip their machines with a radio attachment which makes audible the sound of the gears as they are being run together. In this operation, lapping is halted by the operator as soon as the characteristic sound has diminished to a minimum and before it starts to increase again.

Under the above procedure the gears do assume conjugate shapes, but the tooth, when completely processed, does not take the form of an involute curve nor do the finished gears move with a uniform circular motion.

Another principal avenue of attack on this problem has been the use of a separate lapping element. This has resulted in increased lap capacity, as the material chosen for the lap is softer than the gear to be processed

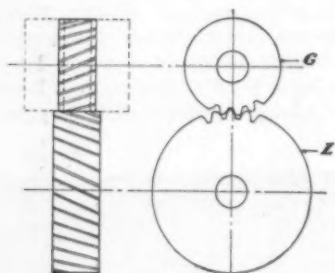


Fig. 1—Parallel axis lapping using oscillating motion parallel to the axes of gears being run together.

the correcting of gear teeth, some of them filed as early as 1880. Although uncertain as to the time it was first initiated, lapping has been one of the principal means of effecting these corrections.

It is important to differentiate between correction of gear teeth by the removal of an appreciable amount of stock and merely a polishing operation in which no great amount of material is removed. This article deals with the correction of gear teeth with an appreciable removal of material.

Recent advances in gear correction practice have made it possible to remove an amount of material hitherto considered impracticable, if not impossible. In fact, it is now economically practicable to remove all the distortion resulting from normal heat treatment. Lap life has also been materially extended, and in certain instances from 500 to 1000 gears are corrected without effecting an error of more than 0.001 in. in the profile of the lap, even though the chordal thickness of the lap teeth may be reduced as much as 0.30 to 0.60 in.

Early Lapping Practices

The early lapping practice was to run a pair of gears in mesh, feeding abrasives into the mating teeth. This was effective in improving somewhat

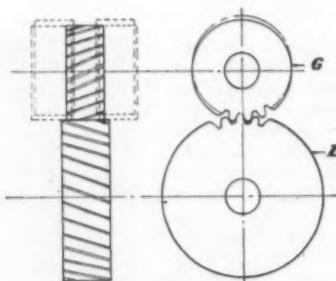


Fig. 2—In this parallel axis lapping, a second motion is employed to vary the center distance between the gears.

traveled in sliding contact by the tip of the tooth is greater than that traveled near the pitch line on the tooth. Consequently the abrasion of the tip is greater than the other part of the tooth. This often results in adding inaccuracies rather than in correcting them. As a matter of fact, many gears have been completely ruined by such methods.

A modification of this parallel axis method uses an oscillating motion parallel to the axes of the gears while they are being run together (Fig. 1). This increases the cutting action at all points on the tooth surface but unfortunately does not materially alter the difference in cutting effect already mentioned.

Further Development of Parallel Axis Method

A further development of this idea was the introduction of a second motion, that is, one to vary the center distance between the gears (Fig. 2) in order to spread out the line of weakest lapping, which occurred on the pitch circle. This phase of gear lapping has reached its

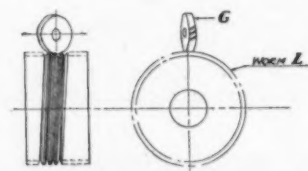


Fig. 3—Large diameter worm laps are made to correspond in angle with the hob by which the gears were cut.

and is of such a character that it more readily held the abrasive compounds. In fact, special lap materials increase the ratio of lap wear to gear wear about 20 to 1.

Another practice embraces the use of emery sticks, profiled to the shape of the teeth, and still another (Fig. 3) uses large worm laps made to correspond in angle with the hob by which the gears were cut. The large worm lap proved more or less successful, providing the operator used excellent judgment and the initial accuracy of the work gear was relatively high.

Worm Lapping Used for 50 Years

Worm lapping, wherein the worm is many times larger in diameter than the gear being corrected, has been used for watch pinions for the last 50 years. Originally these laps were made of cast iron and later of aluminum. In fact, the practice is still followed in some plants that make

gears of this type. In view of the highly competitive nature of the industry and the low purchase price of the product, lapping time for watch pinions is necessarily quite limited.

Worm lapping has also been used to a limited extent in the recent past for automotive gears but without significant success. This process depends too largely upon the judgment of the operator. If continued too far, the work is seriously damaged. Set-up also proves troublesome in that it is not possible to run the gears in their correct position until lapping is completed. The set-up has to be constantly adjusted and this has a tendency to throw serious variations in the tooth profile. These objections are intensified by the fact that high speeds are used and the cuts are taken lengthwise of the tooth profile. The contact period of the tooth point is greater than that of the pitch circle which, as previously explained, results in the irregular removal of stock. Due to the large lap diameter, recutting is very expensive and the difficulty of accurately reforming the lap teeth, which is done by grinding grooves in the worm, is easily recognized.

Internal Lapping

Still another effort to solve the troublesome variation in the amount of cutting at different points on the gear tooth entailed the use of a master internal lap (Fig. 4) having the same number of teeth and profile as the work gear. The work gear is reciprocated inside this lap, contacting first one side and then the other of its teeth. An intermittent indexing

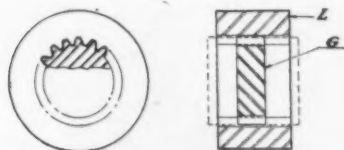


Fig. 4—Internal lapping. The work gear is reciprocated inside the special lap, contacting first one side and then the other of its teeth.

spreads excessive wear over the several lap teeth. The result of this type of lapping, however, shows little improvement in the eccentricity of the finished product. Any given lap rapidly assumes the characteristics of the average of the gears processed. If excessive error occurs in several consecutive pieces, the lap tends to take the same shape as work units.

Another objection to this means of correction is due to the lengthwise cutting on the gear teeth which is inclined to produce a washboard effect and excessive noise in the operation of the completed product. It is also quite difficult to secure accurate master laps. The current practice in producing the lap is to cast it over a master gear and then run it into

LAPPING methods developed to correct inaccuracies in gear teeth are outlined in this article, which also includes data on lapping compounds. The subject is one that is being given increasing attention, with the double objective of assuring maximum quietness and strength of gears under increasing speed and load conditions. The article is from an address at the recent meeting of the American Gear Manufacturers Association.



shape with a variety of selected gears. This practice eliminates the variation due to rolling contact with other gears but introduces a factor of excessive wear, as certain teeth of the lap are seriously scored.

Split Worm and Rack Laps

Another variation in gear correction equipment is the use of the split worm lap which takes up backlash between the gear and lap while running on correct centers. This results in one half of the worm operating on one side of the tooth and the other half on the other side. The tendency of this action is to cut tooth profile rapidly but at the sacrifice of angular correction.

The internal gear has also been used in another way, that is, allowing the work gear to roll with the lap, as in Fig. 5. The action here successfully corrects tooth profile but at the expense of machine time. Another obstacle lies in obtaining internal gears of the necessary size and accuracy.

Another method of gear correction relies on the use of a rack lap, Fig. 6. The teeth of the work gear are par-

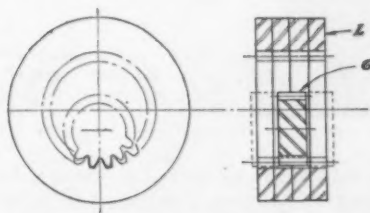


Fig. 5—Internal-external lapping. In this case the work gear is permitted to roll with the lap.

allel to the length of the rack teeth. This method corrects gear inaccuracies with relative success except index error. Inasmuch as any given tooth on the work gear continuously contacts the same tooth on the rack, wear due to index error becomes cumulative. The initial cost of the rack and the cost of its accurate recutting have also proved a serious objection.

Lapping has been done as shown in Fig. 7, using pitch circle disks to limit

the extent of lapping, and when lapping helical gears, this has been coupled with master helical gears, permitting endwise sliding of one gear against another. This practice has the same objection as indicated above, that the speed of lapping at the various points on the teeth is irregular.

Three laps have also been used, running with one gear as shown in Fig. 8 the gears being oscillated on their shaft. This is a multiplication of a simpler method of one lap with axial reciprocation of the gear.

A combination of internal lap and external lap with multiple gear parts running between them is shown in Fig. 9. This device indicates the possibility of flapping a gear on both sides of the teeth at the same time, as a brake can be used on either the central or outside gear; the other gear being driven.

Crossed Axes Lapping

With the increasing pressure of the automotive industry for silent transmissions, it has become imperative for the gear manufacturer to eliminate all errors in gear teeth to a very much higher degree than was heretofore considered necessary. These errors include profile, index, eccentricity, helical angle and quality of finish.

These insistent demands for higher quality have resulted in development of two new lapping practices within the last three years. Both are based on the use of a separate lap and a crossing of the axes of gear and lap. The first is known as cramp lapping (Fig. 10) in which the lap tooth is given an abnormal thickness and in which the feed reduces the center distance between gear and lap. The lap teeth contact both sides of the gear tooth; cutting being accomplished by a lapping compound fed into the gears during operation.

Cramp lapping is very rapid and is an ideal means of correcting excessive eccentricity or index. It has become standard practice in a number of shops manufacturing automotive gears. In explanation, let me say

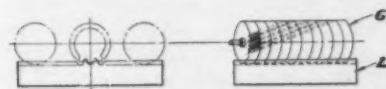


Fig. 6—Rack lapping.

that any material change effected in the center distance between gear and lap is compensated by a change in the angular setting of the axes, inasmuch as the lap and work gears mate in the same way as a pair of skew gears. This angular relation of the two axes is controlled by a vernier fixture on the machine column. The setting is controlled by the use of an angle checking fixture (Fig. 11) which indicates the tooth error by the use of a

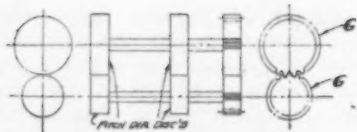


Fig. 7—Restricted center distance lapping. Pitch circle disks are used to limit the extent of lapping.

rack tooth and integral sine bar. The radius of the sine bar is the same as a division on the vernier column scale of the lapping machine.

Angle Reduced to Less Than 30 Deg.

Although the worm lapping process was the first to use crossed axes, the angle between the axes in that process is approximately 83 deg. The new practice of crossed axis lapping, introduced in 1930, reduces this angle to less than 30 deg. and it frequently ranges below 10 deg. The angle used in any given case is the difference between the helical angle of the gear and that of the lap.

The results attained by these newer methods have been so significant that practically 75 per cent of the lapping tools purchased since their introduction incorporate the new principles. One outstanding case comes to mind of a set of gears having the following errors: Involute, 0.004 in., eccen-

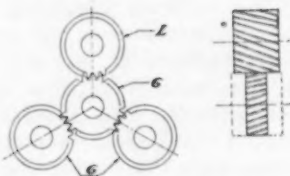


Fig. 8—Three-ring lapping.

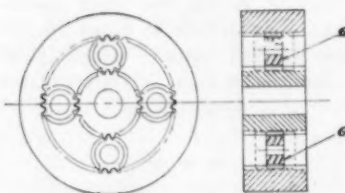


Fig. 9—Combination of internal and external lap with multiple gear parts running between them.

the work gear, which is driven by the lap. After the work gear has been driven a given number of revolutions in one direction, rotation is reversed and progresses in the opposite direction a number of revolutions to complete the cycle. The brake operates throughout the continuous cycle, first in one direction and then in the other. Thus both sides of each work gear tooth are given the same amount of processing. As in the cramp lapping, the axes are crossed. In both methods

tion of grain size and quality in a lapping compound. There is a vast difference in the character of individual grains in any given size

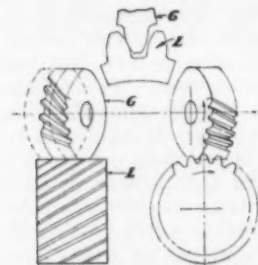


Fig. 10—"Red Ring" cramp lapping method. Both this and the method shown in Fig. 13 are based on use of a separate lap and a crossing of the axes of gear and lap. Excessive eccentricity or index is corrected rapidly.

material. For instance, grain specified for abrasive paper is quite unsatisfactory for gear lapping because it contains a high percentage of needles and slivers. Grain for lapping compound should be of a rounded, irregular shape but never needle-like. Tests have proved that efficiency of cutting action and lap life can be greatly increased by a proper choice of grain and lubricant.

We have used two lubricants, one an oil soluble solution for washing in kerosene and the other a water soluble solution for washing in oil or soda water. The same size and quality of grain are used in each and the same amount of grain. Nevertheless, by carefully conducted tests the water soluble compound is very much more

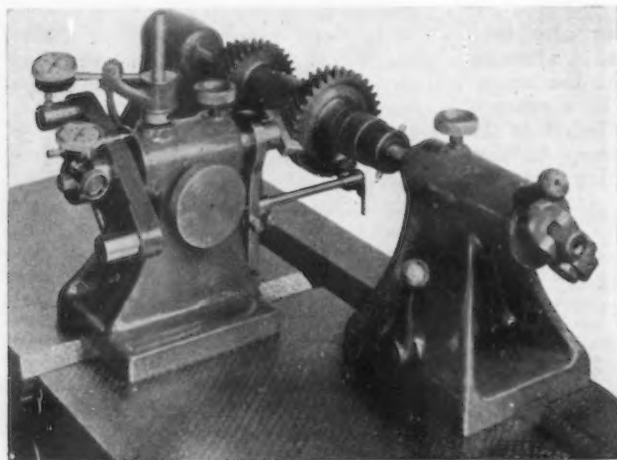
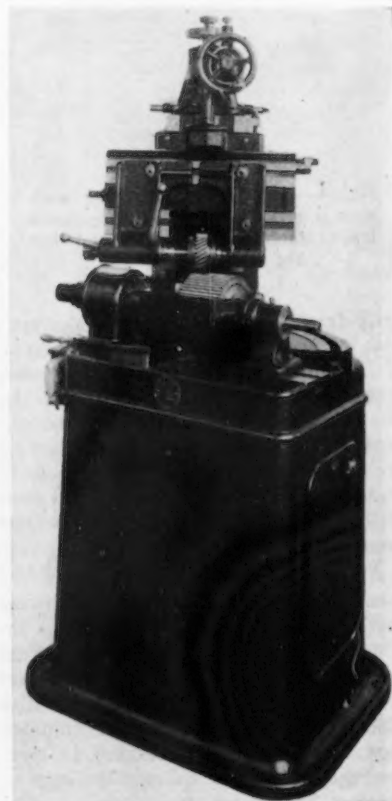


Fig. 11 (at Left)—Close-up of angle checking fixture used to control angular relation of work and gear lap. The radius of the sine bar is the same as a division on the vernier column scale of the lapping machine.

Fig. 12—(At Right) Lapping machine arranged for cramp-action lapping.



tricity, 0.005 in., cumulative index, 0.008 in., helical angle, 0.005 in. on a 3 in. radius. These gears were corrected to a final involute error of 0.0005 in., eccentricity, 0.001 in., cumulative index, 0.001 in., helical angle, 0.001 on a 3 in. radius. Although considerable material had to be removed to attain this result and backlash was considerably increased, it is an extreme example of what can be done by means of the newer lapping methods.

In the second of these methods, known as power tailstock lapping (Figs. 13, 14 and 15), the center distance between gear and lap remains constant and a power tailstock is used to effect a braking action on

an automatic electric reversing and timing mechanism controls the number of revolutions.

Lapping Compounds Greatly Improved

The cutting or lapping compound has also been given a great deal of study and has shown remarkable improvement in recent years. Lap life has been raised from approximately 100 gears to 500 and as high as 1000 in special cases. A lap which was used for automotive transmission gears shows a total chordal thickness wear of 0.079 in. with only a variation of 0.001 in. in profile.

Too much attention cannot be devoted to the proper choice and inspec-

efficient than the one having the oil base. With one exception, all plants on our customers' list are using the water soluble compound. I do not believe the average shop man appreciates the potential saving avail-

with a grinding machine so as to remove this excess before final lapping. On a recent test, in which the grinding time on 12 in. diameter gears was 67 min., it was possible to take a single grinding operation of 15 min.

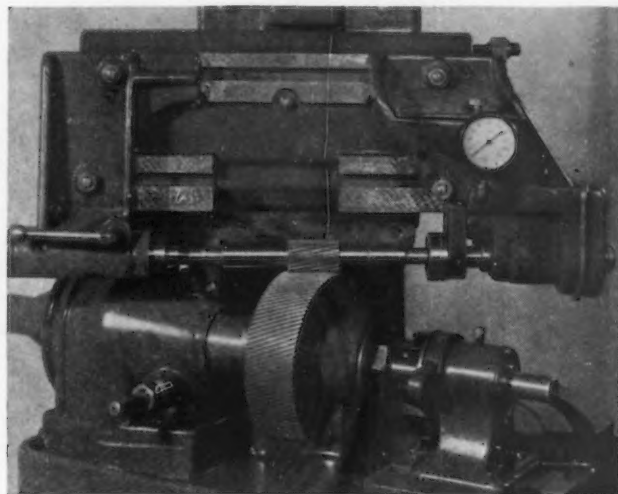


Fig. 14, Fig. 15—Lapping machines arranged for power tailstock lapping. The center distance between gear and lap remains constant and a power tailstock is used to effect a braking action on the work gear, which is driven by the lap. The amount of braking force is regulated to suit the work being processed. One side of the gear teeth is acted upon at a time, and by reversing the rotation at the mid-point of the cycle, both sides of the gear teeth are corrected.



able to him in the proper choice of a cutting medium.

Lapping Time About 2 Min. Per Unit

Standard lapping time today for reasonably well cut gears is about 2 min. per unit having a 1 in. face and 4 in. diameter. This assumes reasonable control of gear cutting and heat treatment. We have found in other shops that machine time for lapping gears of similar size amounts to as much as 5 min., and in still others, handling carburized gears inaccurately machined, machine time has amounted to as much as 10 hr. Errors of this magnitude should be eliminated by adequate control of gear cutting and heat treatment.

I recall one job having an eccentricity of 0.010 in. on a 5 in. gear. The teeth were out of parallel with the axes as much as 0.010 in. in 3 in. and the index jump from tooth to tooth was as high as 0.004 in. The holes were ground out of line with the teeth to the extent of 0.005 in. in 3 in. Such a condition of course requires supervision rather than lapping.

One of the finest runs I remember was a lot of 30,000 gears. Rejection for gear noise after lapping was only 1 per cent and the lapping time averaged 1 min. per gear. Lap life on this job was approximately 900 gears per cutting, and the lap was recut twice, which gave a total life of 2700 gears. These were standard automobile transmission gears of several well-known designs which were accurately cut and treated.

Grinding Before Lapping

When excessive distortion occurs due to high carbonized heats on large gears, it has been found very advantageous to take a single roughing cut

and lapping time of 6 min., total of 21 min.

In the lapping of oil-treated gears, the standard lapping time varies from

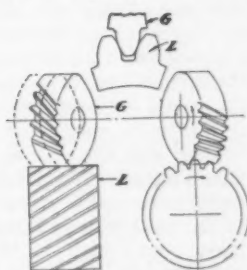


Fig. 13 — "Red Wing" power tailstock method of lapping.

1 to 4 min. on gears of 1 in. face and 4 in. in diameter, and the proportional size of the gears indicates the increased lapping time required for the same cutting and heat-treatment conditions.

Use of accurate laps in the finishing of heat-treated gears gives the shop operators a very clear indication of the errors in the cutting, as the high parts are easily recognized.

On production runs, it has frequently occurred that the cutting operations were subject to prompt investigation due to the appearance of the gears after normal lapping, as the lapping cut showed the profile or angle of the gears in error.

Steel Railroad Tie

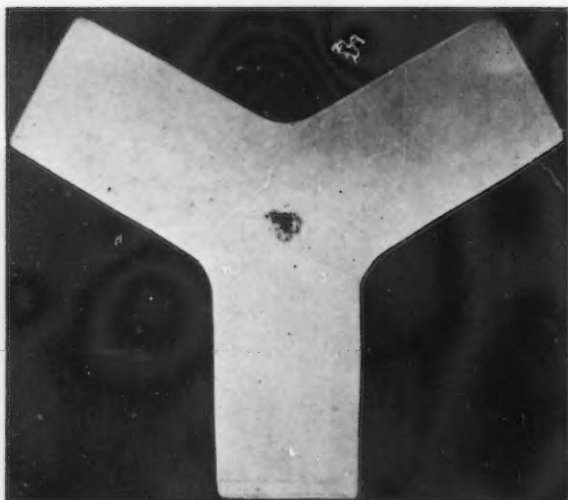
A FORM of steel tie and a railroad track construction in that connection have been patented by W. F. Walker, manager of the Walker Co., Macungie, Pa. A section of track built according to the system has been constructed for general inspection, as shown in the illustration. The tie comprises a pair of I-beams (5-in. beams for track with 130-lb. rails), the two beams being separated by 7-in. lengths of channels, bolted or welded to the beams as separators.

The space between the beams may be filled with concrete and otherwise the tie rests on the road ballast as in the case of timber ties.

The rail fastening includes a U-bolt which passes through a hole in the web of each I-beam so that the center of the bolt has a fulcrum support in the beam and the bolt shanks are inclined upward and away from the rail base, with the two shanks spanning the top flange of the beam. Nuts

(Concluded on Page 68)





CROSS-SECTION of a winged ingot shows the marked concentration of the segregation and piping in the central triangle of the ingot.

THE winged ingot method of casting steel as developed by the Firth-Sterling Steel Co., McKeesport, Pa., from an invention by L. Gerald Firth, general manager of the company, is now past the experimental stage. It has been used in the manufacture of steel in various grades during the past two years, and in ingots weighing from 1000 to 10,000 lb. While the unique character of the invention has been recognized in the several countries which have granted patents on it, after an examination of the "prior art," its possibilities as a method of improving steel are just being realized.

This method of casting, as described in *THE IRON AGE*, Feb. 2, 1933, page 197, eliminates an undesirable structural condition at the center of ingots which steel makers have been trying for years to overcome. Along with the improvement of the center has come a distinct advance in quality and uniformity without an increase in cost. In some alloy grades, there is a slight increase, but on many grades, the winged ingot offers actual savings over present methods, because of the reduction of ingot discard and increased recovery in subsequent operations.

Center of the Common Ingot

The macro-etch (hot acid) test which has come into general use fo-

cused the attention of both users and steel makers on the structure of the center of bars and billets. Steel makers have endeavored to offset the tendency of steel to segregate and to throw absorbed gases along with non-metallic inclusions to the center of an ingot during cooling. At the same time, they also tried to eliminate "pipe" and porous conditions which cause excessive loss due to the heavy cropping or cutting back necessary to remove all traces of bad center. An incidental but very important phase of the problem was the aim to secure steel which would be relatively uniform in structure in all parts of the cross section of forging billets and finished bars.

In ordinary practice, when molten steel is poured into square or similar ingot molds, there is first a quick chilling where the metal in contact with the mold forms into "chill crystals," followed by a gradual cooling of the metal from the surface toward the center of the ingot. During this cooling, the evolved and occluded gases along with impurities, such as non-metallic inclusions, are "frozen out" of the solidifying metal and forced toward the center and up toward the top of the ingot.

As a result, the steel toward the bottom and nearest the surface of the ingot has the best structure. Hence, there is the tendency toward bursting

Winged Ingot In

By **DONALD G. CLARK**

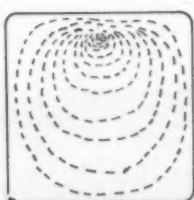
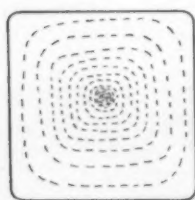
Firth-Sterling Steel Co., McKeesport, Pa.

the center in forging as the greatest strain comes on the weakest structure. In many tools and dies the heaviest impacts or intricate patterns come on that portion of the die which is made from this central part of the bar and billet. In other tools, such as ordinary chisels, the cutting edge is made from what was originally the center of the ingot and billets. In many parts of machinery and equipment, metal is so formed that the greatest stresses come on that part which was originally the center rather than the outer part of an ingot, billet and bar.

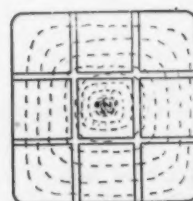
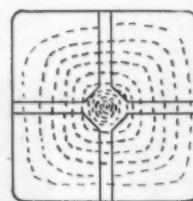
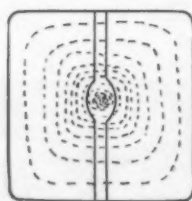
Cooling Lines Studied

In discussing various methods used to eliminate this undesirable center structure, the progressive cooling action which occurs within the ingot must be visualized. Taking cross sections, this action may be illustrated by the accompanying figures wherein the light dotted lines show how the cooling or crystallization progresses from the surface toward the center.

Fig. 1 shows the cooling lines in the conventional square ingot filled vertically when top or bottom poured. By varying the taper, the depth of pipe may be changed but the cooling action remains practically the same, giving a clearly defined difference between the structure at the surface and at the center. Attempts to cast horizontally or at various angles re-



FIGS. 1 and 2—The lines of progressive solidification and the segregation centers in the case of conventional ingots are as shown in Fig. 1 for the vertically cast, and as in Fig. 2 for the more or less horizontally cast.



FIGS. 3, 4 and 5—Splitting of ordinary ingots or billets by different cuts may be attempted to bring access to the segregation centers, which may be removed, as by milling.

ot Improves Structure of Steel ▲▲▲

sult in moving the "center" toward one surface as shown in Fig. 2, where the poorer structure is off center but still well within the ingot.

This central structural condition has been eliminated by splitting ingots lengthwise as shown in Fig. 3, where the billet was cut in two and the center milled or planed out; or as in Fig. 4, where the ingot was split into four parts and one corner of each removed to take out center steel; or as in Fig. 5, where, by means of four cuts through the ingot, eight good split ingots were formed while the ninth or central one was discarded, carrying with it all the steel of more open structure. This split ingot method is necessarily costly, because of the number of cuts necessary in the case of the type illustrated in Fig. 5, or the necessity of milling or planing, in the case of types in Figs. 3 and 4.

In the winged ingot method, an ingot having a cross section similar in shape to Fig. 6 is produced. It is obvious that in cooling along the lines illustrated in the above sketches, the chill crystals form immediately on three sides and then the solidification, progressing as indicated, forces impurities and gases toward the central section—the triangle in Fig. 6. Before these "winged" ingots are cool, the wings are cut off on the lines indicated (X, Y, Z) in the drawing. The cutting is done with a torch. The heat of the ingot helps to make it a very inexpensive operation. In the case of some of the higher alloy steels, it is necessary to machine-cut the wings.

These cut-off ingots are then cogged in the regular way and carried

WHILE the winged ingot was developed to make for uniformity of tool steels, the author believes that the unexpected economies realized in manufacture, together with dependable uniformity of quality, open a field for the ingot in the making of all kinds of steel.



through the rolling or hammer-finishing operations in such a way that the differences in structure between surfaces 1, 2 or 3 and surface 4 in Fig. 7 disappear. The breaking down and the refining of the structure which occurs to a greater extent on the surface than at the center in forging and rolling corrects the difference between sides 2 and 4. The uniform heating for the finishing operations, together with the scaling in hammering and rolling, equalizes the difference in structure which originally occurs due to the chill crystals on the three sides, and the absence of them on the fourth.

Physical Properties Improved

Although physical properties of tool steels have never been considered a basis for the selection of steel for cutting tools, a comparison of the physical properties of the metal in various parts of billets made from the ordinary square ingots, and the same relative portions of billets made from winged ingots, discloses a striking superiority in the way of uniformity in the winged ingot product. It also refutes possible criticism of the structure on the fourth or cut side.

Pieces for tensile and impact tests were taken at the positions shown in Fig. 8 from billets made from winged ingots, and also from corresponding portions, Fig. 9, of billets made from square ingots. When tests were made it was found that the transverse

specimens B taken through the center of the billet from a square ingot show elongation and reduction of area values of about one-half the values of specimens A just below the surface. The tests of specimens from winged ingots showed these values of the test pieces B through the center to be almost the same as specimens A from the outer and specimens C from inner (torch cut) side of the wing. The inner and outer sections show values so nearly alike on the average that it cannot be said that one is better than the other. The tensile strength and elastic limit figures do not show any material difference.

On Izod impact tests the values of pieces taken at B from square billets were about four-fifths of the values of specimens A; while on the winged ingot, specimens B were almost the same as A and specimens from C (the "cut side") were even higher than the others.

Further tests to determine the effect of cutting one side of an ingot were made by hardening cylindrical pieces about 18 in. long and checking the warpage to see if there were any tendency toward more or less motion or distortion on the cut side. The tests again proved this side to be the same as the opposite, there being no more warpage in one direction than another.

Drastic etch tests, of course, reveal a very slight variation between one side and the other in the case of larger pieces, but in the smaller sizes, no difference is perceptible.

Field tests have confirmed shop tests, indicating that tools, dies and parts made from winged ingots have greater resistance to fatigue, impact and wear than those made in the usual way. In forging, there is less danger of ruptured centers, and in heat treatment, less danger of breakage, all because of the more uniform structure.

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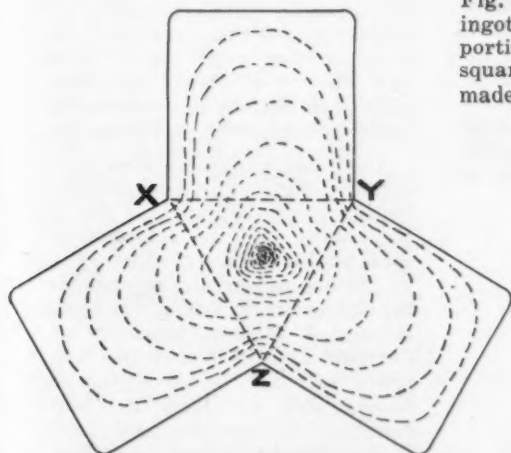
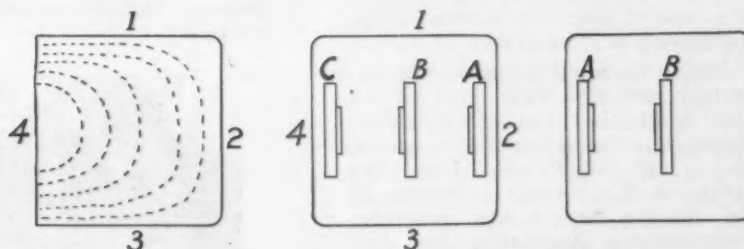


FIG. 6—The lines of cooling of the winged ingot with segregation of impurities and gases in the central triangular section.



FIGS. 7, 8 and 9—The working of the metal in forging or rolling is found to correct any differences of structure in the ingot surfaces 1, 2 and 3, Fig. 7, from that of the cut-off surface, 4. Test specimens from positions shown in Fig. 8 of the billet from a winged ingot show uniformity in physical characteristics such as are not found in the case of specimens from the corresponding positions of the billet from the ordinary ingot, Fig. 9.

Engineering Week in Chicago

Technical Societies, at World's Fair City, Give Intensive Attention to Their Meetings

ENGINEERING week, celebrated in Chicago, came to a close July 1. The leading engineering societies of the country, selecting the city of the Century of Progress World's Fair as the place of their mid-year conventions, scheduled them all for substantially the same time. Fifteen national organizations convened. Attendance exceeded expectations in some cases but in general might be better described as only fair. The exposition was the drawing card against the deterrents of the depression, and brought goodly numbers to Chicago, but the technical sessions did not suffer because of the proximity of the show. In fact, the affairs of the engineering associations got first attention. Except for Wednesday, June 28, which was set apart as Engineers' Day at the fair, few took time to attend the Exposition until their society obligations had been met.

There was a bewildering array of meetings. Many of particular interest to a single individual came simultaneously; yet the necessity of foregoing one or another of the gatherings was overbalanced by the opportunity of making numerous contacts with all classes of engineers. Meanwhile Chicago was not conscious of the presence of the engineers, so many and varied were the activities in the city and in the exposition. That fact was probably salutary; otherwise, with some fifteen groups of meetings in progress at one and the same time in scattered hotels, the impression might well have gone forth of a woeful lack of solidarity in the engineering profession as a whole.

Among the associations holding important meetings were those of the civil, mechanical and industrial engineers, together with the Econometric Society, at the Palmer House, the mining and materials engineers at the Stevens, where the American Foundrymen's Association had just completed its main sessions; and the electrical engineers at the Edgewater Beach Hotel. There was a notable two-day meeting of the open-hearth committee of the American Institute of Mining and Metallurgical Engi-

neers, a division which has come to be virtually a society within a society.

The meeting of the materials people was the regular annual convention of the American Society for Testing Materials, and this organization, in spite of a series of uncomfortably hot and humid days, proved as intensive as usual in the formulation and modification of specifications and other standards for engineering materials. The American Society of Mechanical Engineers offered an imposing list of sessions covering most of the divisions of mechanical engineering. The open-hearth deliberations of the mining engineers covered a scope of program that promises to develop sooner rather than later a codification of steel-making processes.

Joint Activities of the Societies

THE joint activities of the engineers were signalized principally by a banquet at the Stevens Hotel, June 28. There was also an open-air meeting in the stadium of Soldiers' Field to witness the bestowal of the Guggenheim medal on Juan de la Cierva, of Spain, for the development of the autogiro, in one of which he came to the field for the ceremony.

A dinner of the boards of direction of the four founder societies on June 27 was addressed by the presidents of those societies, including Dr. Frederick M. Becket for the American Institute of Mining and Metallurgical Engineers and Dr. A. A. Potter for the American Society of Mechanical Engineers. This dinner party served to crystallize views in the matter of

closer coordination of the engineering societies and the establishment of a singleness of purpose in matters broadly concerning engineering.

A boat ride on Lake Michigan, on Thursday night, arranged by the Chicago section of the American Society of Mechanical Engineers, also brought the engineers together.

Industrial executives among the engineers took advantage of the opportunities to discuss informally on occasion the problems to be met in connection with the industrial recovery movement, but probably the more fruitful of these meetings were those held in connection with the convention of the American Foundrymen's Association at the end of the preceding week. The meeting of this technical organization of the foundry industry brought divisional groups together so they could discuss the question under the direction of such instrumentalities as the Malleable Iron Institute, the Gray Iron Institute and the Steel Founders' Society.

The observation of the Chicago meetings is that codes of practice are slow in the making, particularly in the branch of an industry without a trade association. The evidence of these arranged and accidental group meetings is also that the better organized manufacturers will show the way to meet the requirements of the legislation and also that the trade association movement has a decidedly new lease on life with individuals of high qualifications in considerable demand to conduct those associations.

The joint banquet served to reassert the engineer's large part in promoting human happiness in the face of the charge that his achievements in mass production and the high efficiency of mechanization are responsible for the distress of the times. The speakers, Edward J. Mehren, president of the Portland Cement Association and for years editor of *Engineering News-Record*, and Dr. Karl T. Compton, president of Massachusetts Institute of Technology, emphasized that the engineers have brought us to a state of living that is highly favorable for the extended development of a higher



base of ethics and morals, that what has already been accomplished in industry has proved especially the value of research and that the key for the future is cooperation along with research. The banquet sounded a high note of gratitude for the benefactions of the engineer, while emphasizing his large opportunities and heavy responsibilities in the future.

There was also a joint evening meeting, June 27, of the engineering societies and Section M (Engineering) of the American Association for the Advancement of Science to listen to an address by Dr. A. P. M. Fleming, manager of the research and education department of the Metropolitan-Vickers Electrical Co., Manchester, England. In addition, on several of the days there were large joint luncheons, with a single notable speaker in each case.

Elsewhere and later, as space is available, the main features of the technical contributions to the meetings will be presented. Also separately will be covered the high points of the specification writing of the American Society for Testing Materials.

One of the events of the meeting of the Society for the Promotion of Engineering Education was the bestowal of the Lamme medal on Dean Dexter S. Kimball, College of Engineering, Cornell University, Ithaca, N. Y., who, incidentally, was the author at the meeting of the Econometric Society of an address entitled, "The Engineering Economist of the Future."

Testing Materials Affairs

THE American Society for Testing Materials was able to operate within its current income, as explained by the report of its executive committee, and did not have to call upon its surplus, nor upon a favorable balance of \$5,200 from previous years' operations that had been set aside as a contingency fund. The membership was reported as 3733 on June 1, or about 15 per cent less than the peak of the society membership.

Tentative revisions to existing standards may hereafter be accepted for publication between annual meetings on the recommendation of Committee E-10. The executive committee also reported the appointment of W. H. Fulweiler, past-president of the society and chemical engineer, United Gas Improvement Co., Philadelphia, as American member of the Permanent Committee of the International Association for Testing Materials, succeeding the late Dr. George K. Burgess.

Dr. H. J. Gough, superintendent of the engineering department, National Physical Laboratory, England, delivered the Edgar Marburg lecture this year in a session jointly sponsored by the materials society and Section M of the American Association for the Advancement of Science. His

was a searching study into "Crystal-line Structures in Relation to Failure of Metals Especially by Fatigue."

Exhibition of Testing Equipment

An exhibit of testing equipment and apparatus was held in conjunction with the A.S.T.M. meeting. The first such exhibit was held two years ago and the plan was repeated to provide for exhibits of commercial apparatus of manufacturers and distributors and also non-commercial apparatus developed in research, government and university laboratories, together with exhibits of committee work in the apparatus field. The industrial depression reduced the number of exhibitors materially but there were shown a number of new products of more than passing importance. Among these may be mentioned a new tensile and compression testing machine built by the Baldwin-Southwark Co., Philadelphia, incorporating Chatillon springs in the weighing mechanism, a Rockwell hardness testing machine with a gooseneck feature that allows for ascertaining hardness of an internal surface, this machine being one of a number exhibited by the Wilson Mechanical Instrument Co.; also a recording strain gage developed by A. V. deForest and shown in the Baldwin-Southwark exhibit, this being a tiny instrument for ascertaining what takes place in an engineering structure or machine in actual operation or *in situ*.

Prof. T. R. Lawson, Rensselaer Polytechnic Institute, Troy, N. Y., succeeded Cloyd M. Chapman to the presidency of the American Society for Testing Materials. The other new members of the governing board, who now have taken up the duties of their offices, were mentioned in these columns in the issue of June 22, page 995.

Doty to Head Mechanical Engineers

THE nominations for officers of the American Society of Mechanical Engineers for the year beginning in December were announced at the Chicago meeting as follows:

President, Paul Doty, chairman of the Minnesota State Board of Registration, St. Paul, Minn.

Vice-Presidents—H. L. Doolittle, Southern California Edison Co., Los Angeles; William L. Batt, president, S K F Indus-

tries, Inc., New York; Ely C. Hutchinson, president, Edge Moor Iron Co., Edge Moor, Del., and Elliott H. Whitlock, Cleveland.

Managers—James M. Todd, consulting engineer, New Orleans; Prof. Ernest L. Ohle, Washington University, St. Louis, and Prof. James A. Hall, Brown University, Providence, R. I.

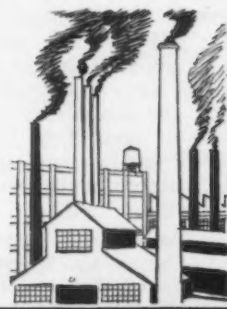
A departure in sectional activity of the mechanical engineers was approved by the council of their society. By this change, presumably temporary or experimental, instead of each of the 72 sections sending an official delegate to the annual meeting in New York in December, there will be group conferences at places central with regard to each group of sections and these conferences in turn will elect a representative to the New York annual meeting. These group conferences of sections' delegates are to be held probably some time in the first half of October. Besides New York for the metropolitan section, the places selected for the group conferences are: Springfield, Mass., Syracuse, N. Y., Columbus, Ohio, Atlanta, Davenport, Iowa, and Salt Lake City.

Midwest Power Show

A POWER show was also one of the features of Engineering Week. What is known as the Sixth Midwest Engineering and Power Exposition had a considerable amount of space in the exhibition areas of the Stevens Hotel. Included among the exhibiting companies were the following:

Aetna Ball Bearing Co., Chicago; American Propeller Co., Inc., South Bend, Ind.; Ames Pump Co., New York; E. B. Badger & Sons Co., Boston; Barber-Colman Co., Rockford, Ill.; Barco Mfg. Co., Chicago; Barrett-Cravens Co., Chicago; Black & Decker Mfg. Co., Towson, Md.; Breuer Electric Mfg. Co., Chicago; Chicago Belting Co., Chicago; Cochrane Corp., Philadelphia; Dearborn Chemical Co., Chicago; Ehret Magnesia Mfg. Co., Valley Forge, Pa.; Fairfield Engineering Co., Marion, Ohio; Fulton Siphon Co., Knoxville, Tenn.; Garlock Packing Co., Palmyra, N. Y.; Graton & Knight Co.; Graver Tank & Mfg. Co., East Chicago, Ind.; Hagan Corp., Pittsburgh; Hays Corp., Michigan City, Ind.; International Nickel Co., Inc., New York; Keasbey & Mattison Co., Ambler, Pa.; Kieley & Mueller, Inc., New York; Merkle-Korff Gear Co., Chicago; Norma-Hoffman Bearings Corp., Stamford, Conn.; Osborn Mfg. Co., Cleveland; Parker Appliance Co., Cleveland; William Powell Co., Cincinnati; Republic Flow Meters Co., Chicago; J. E. Rhoads & Co., Philadelphia; S K F Industries, Inc., New York; Sarco Co., Inc., New York; C. E. Squires Co., Cleveland; Yale & Towne Mfg. Co.

Besides the societies already mentioned, the organizations participating in Engineering Week in one way or another were the following: Institute of Radio Engineers, American Ceramic Society, National Council of State Boards of Engineering Examiners, American Association of Engineers, American Society of Refrigerating Engineers and the Western Society of Engineers.





Offers Specifications for Heavy Steel Plates

Materials Engineers at Chicago Also Approved
New Homogeneity Clauses, Weight Tolerances
for Bars and Plan to Consolidate Specifications

TWO new specifications for thick plates for boilers and other pressure vessels were proposed as tentative at the annual meeting in Chicago of the American Society for Testing Materials held in the week of June 26. One of these is for high-tensile strength carbon-steel for 2-in. thickness and under and the other for like steel for thicknesses from 2 to 4 in. New wording of the homogeneity test clause in the specifications for plates for forge welding, of the flange and firebox qualities, was also approved at the meeting.

To Draw Consolidated Specifications

A notably important undertaking has been initiated under the auspices of the committee on steel, A-1. This contemplates a consolidation of existing standards in the interest of simplification. For example, a consolidation is regarded as likely of the specifications for steel castings in general and those for carbon steel castings for railroad use; clauses will cover special requirements to differentiate castings for marine use, say, from those for general use. Similarly action for a consolidated specification for all kinds of rivets reached the point that a committee was established to investigate the subject. Johnathan Jones, McClintic-Marshall Co., Bethlehem, Pa., was appointed chairman; and J. O. Leech, Carnegie Steel Co.; William C. Masters, American Institute of Bolt, Nut and Rivet Manufacturers, Cleveland, and representatives of the U. S. Navy, the shipbuilders, the boiler manufacturers and the consumer are to be members. Early simplification, under the same plan, will cover also structural steel and forging steel.

New Weight Tolerances for Concrete Bars

What was hailed as the most constructive move taken in years in reference to concrete reinforcement bars

was a revision of the weight tolerances of both billet and rail-steel bars. In the tentative standard now advanced to standard a clause has been inserted stipulating that the weight of any lot shall not vary more than $3\frac{1}{2}$ per cent for bars $\frac{3}{4}$ in. and larger nor more than 5 per cent for bars less than $\frac{3}{4}$ in. in diameter. The proposal came from producer interests on the committee.

In the category of new proposed tentative standards, besides specifications for heat-treated carbon-steel elliptical springs for railroad use and alloy steel castings for structural work (proposed at the March meeting the Committee A-1 as reported in THE IRON AGE of March 16), a tentative specification was also approved for pipe for high temperature service.

Specifications for Heavy Plates

In respect to the new tentative plate specifications, the carbon content for plates $\frac{3}{4}$ in. thick or under is set at 0.32 per cent as a maximum and for plates over $\frac{3}{4}$ in. at 0.35 per cent. For plates of 2 to 4-in. thickness, the allowable manganese range is 0.50 to 0.90 per cent, but a noteworthy point in this specification is the inclusion of a proviso to meet the dual requirements of 0.35 per cent carbon and the stipulated tensile strength of 70,000 to 82,000 lb. per sq. in. for the grade B material; the clause suggests that when it is found difficult to satisfy the strength with the 0.35 per cent carbon steel intended for fusion welding, it may be necessary to order plates of less gage than 4 in., as by agreement between maker and buyer.

The homogeneity test for thick plates came in for modification. For plates over $2\frac{1}{4}$ -in. thick, the specimen may be grooved at one place on both sides to leave a fracture which will include the horizontal axis and have a face at least 2 in. in depth; the fractured surface must not show any single seam or cavity more than $\frac{3}{8}$ in. in length.

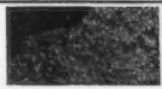
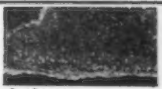
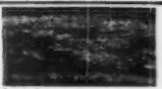
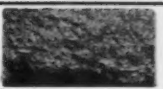

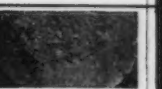


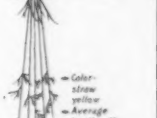
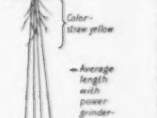

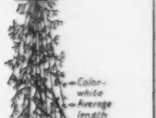
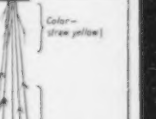
The wording of the homogeneity test clause to go in the specifications for steel plates of flange and firebox quality for forge welding is as follows:

(a) The object of this test, which is required for firebox steel only, is to open and render visible to the eye any seams due to failure to weld up or to interposed foreign matter, or any cavities due to gas bubbles in the ingot. The test specimen shall not show any single seam or cavity more than $\frac{1}{4}$ in. in length for plates $\frac{3}{4}$ in. and under in thickness, more than $\frac{3}{8}$ in. in length for plates over $\frac{3}{4}$ in. to 4 in. inclusive, nor more than $\frac{1}{2}$ in. in length for plates over 4 in. to 6 in. inclusive, in any of the fractures obtained in accordance with paragraph (b). One side of each fracture shall be examined and the lengths of the seams and cavities determined, a pocket lens being used if necessary.

(b) The test may be made on a broken tension test specimen when an 8-in. gage length specimen is used. The test specimen shall be taken adjacent, sidewise or lengthwise, to the top tension test specimen, when a 2-in. gage length tension test specimen is used. For plates $\frac{3}{4}$ in. and under in thickness the specimen shall be nicked or grooved transversely, in three places, about $1/16$ in. deep. The first groove shall be 2 in. from the square end, and each succeeding groove on the opposite side about 2 in. from the preceding one. The specimen shall be broken at each groove in succession with a hammer or press, the bending being away from the groove. For plates over $\frac{3}{4}$ in. to $2\frac{1}{4}$ in. inclusive in thickness the specimen may be grooved about $1/8$ in. deep, at one place on one side. For plates over $2\frac{1}{4}$ in. in thickness the specimen may be grooved at one place on both sides to leave a fracture, which will include the horizontal axis of the plate and have a face at least 2 in. in depth.



SIMPLE TESTS FOR IDENTIFYING

		WHITE CAST IRON*	GRAY CAST IRON	MALLEABLE* IRON	WROUGHT IRON	LOW-CARBON STEEL AND CAST STEEL	HIGH-CARBON STEEL	ALLOY** STEEL
APPEARANCE	FRACTURE	Very fine silvery white silky crystal-line formation	 dark gray	 dark gray	 bright gray	 bright gray	 very light gray	 medium gray
	UNFINISHED SURFACE	Evidence of sand mold; dull gray	Evidence of sand mold; very dull gray	Evidence of sand mold; dull gray	Light gray smooth	Dark gray; forging marks may be noticeable; cast-evidences of mould	Dark gray; rolling or forging lines may be noticeable	Dark gray; relatively rough; rolling or forging lines may be noticeable
	NEWLY MACHINED SURFACE	Rarely machined	Fairly smooth; light gray	Smooth surface; light gray	Very smooth surface; light gray	Very smooth; bright gray	Very smooth; bright gray	Very smooth; bright gray
CHIP TEST	APPEARANCE OF CHIP	Small broken fragments	Small partially broken chips but possible to chip a fairly smooth groove	Chips do not break short as in cast iron	Smooth edges where cut	Smooth edges where cut	Fine grain fracture; edges lighter in color than low-carbon steel	**
	SIZE OF CHIP		1/8 in.	1/4-3/8 in.	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired	**
	FACILITY OF CHIPPING	Brittleness prevents chipping a path with smooth sides	Not easy to chip because chips break off from base metal	Very tough therefore harder to chip than cast iron	Soft and easily cut or chipped	Easily cut or chipped	Metal is usually very hard but can be chipped	**
SPARK TEST	COLOR, SHAPE, AVERAGE LENGTH WITH POWER GRINDER, AND ACTIVITY OF SPARKS ARE DISTINGUISHING DETAILS	 Color-red Color-straw yellow Average length with power grinder-20 in. Volume-very small Fewer sparklers than gray cast iron Sparklers are small and repeating	 Color-red Color-straw yellow Average length with power grinder-25 in. Volume-small Many sparklers Sparklers are small and repeating	 Color-straw yellow Average length with power grinder-55 in. Volume-large Many sparklers Sparklers are small and repeating	 Color-straw yellow Average length with power grinder-55 in. Volume-large Many sparklers Sparklers are forked Color-white	 Color-white Average length with power grinder-55 in. Volume-moderately large Few sparklers Sparklers are forked	 Color-white Average length with power grinder-55 in. Volume-large Many sparklers Sparklers are small and repeating	 Color-white Average length with power grinder-50 in. Volume-moderate Moderate number of sparklers Sparklers are forked
	SPEED OF MELTING (From Cold State)	Moderate	Moderate	Moderate	Fast	Fast	Fast	**
	COLOR CHANGE WHILE HEATING	Becomes dull red before melting	Becomes dull red before melting	Becomes red before melting	Becomes bright red before melting	Becomes bright red before melting	Becomes bright red before melting	**
BLOWPIPE TEST	APPEARANCE OF SLAG	A medium film develops	A thick film develops	A medium film develops	Oily or greasy appearance with white lines	Similar to molten metal	Similar to molten metal	**
	ACTION OF SLAG	Quiet; tough, but can be broken up	Quiet; tough but possible to break it up	Quiet; tough, but can be broken	Quiet; easily broken up	Quiet	Quiet	**
	APPEARANCE OF MOLTEN PUDDLE	Fluid and watery; reddish white	Fluid and watery; reddish white	Fluid and watery; straw color	Liquid; straw color	Liquid; straw color	lighter than low-carbon steel has a cellular appearance	**
	ACTION OF MOLTEN PUDDLE UNDER BLOWPIPE FLAME	Quiet; no sparks; depression under flame disappears when flame is removed	Quiet; no sparks; depression under flame disappears when flame is removed	Boils and leaves blowholes; surface metal sparks; interior does not	Does not get viscous; generally quiet; may be slight tendency to spark	Molten metal sparks	Sparks more freely than low-carbon steel	**




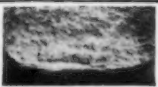
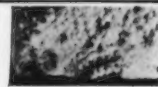
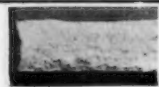
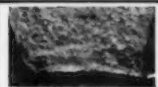


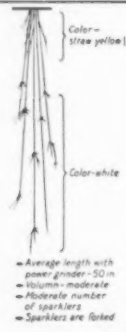
*Very seldom used commercially.
*Malleable iron should always be bronze-welded.

**Alloy steels vary so much in composition and consequently in results of tests that experience is the best solution to identification problems. Stainless steel spark test is shown.

†Due to white or light color metals; aluminum and magnesium.
††Weight, softness, and grain.

This useful chart was drawn up by the Linde Air Products Co., New York, to facilitate identifying metals that are to be oxy-acetylene welded, particularly in the case of iron and steel.

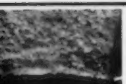
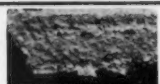

FOR IDENTIFYING METALS

LOW-CARBON STEEL AND CAST STEEL	HIGH-CARBON STEEL	ALLOY** STEEL	COPPER	BRASS AND BRONZE	ALUMINUM AND ALLOYS†	MONEL METAL
						
bright gray	very light gray	medium gray	red color	red to yellow	white	light gray
Dark gray; forging marks may be noticeable; cast—evidences of mould	Dark gray; rolling or forging lines may be noticeable	Dark gray; relatively rough; rolling or forging lines may be noticeable	Various degrees of reddish brown to green due to oxides; smooth	Various shades of green, brown, or yellow due to oxides; smooth	Evidences of mold or rolls; very light gray	Smooth; dark gray
Very smooth; bright gray	Very smooth; bright gray	Very smooth; bright gray	Bright copper red color dulls with time	Red through to whitish yellow; very smooth	Smooth; very white	Very smooth; light gray
Smooth edges where cut	Fine grain fracture; edges lighter in color than low-carbon steel	**	Smooth chips; saw edges where cut	Smooth chips; saw edges where cut	Smooth chips; saw edges where cut	Smooth edges
Can be continuous if desired	Can be continuous if desired	**	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired	Can be continuous if desired
Easily cut or chipped	Metal is usually very hard but can be chipped	**	Very easily cut	Easily cut; more brittle than copper	Very easily cut	Chips easily
			No spark	No spark	No spark	Spark very similar to nickel
Fast	Fast	**	Slow	Moderate to fast	Faster than steel	Slower than steel
Becomes bright red before melting	Becomes bright red before melting	**	May turn black and then red; copper color may become more intense	Becomes noticeably red before melting	No apparent change in color	Becomes red before melting
Similar to molten metal	Similar to molten metal	**	So little slag that it is hardly noticeable	Various quantities of white fumes, though bronze may not have any	Stiff black scum	Gray scum; considerable amounts
Quiet	Quiet	**	Quiet	Appears as fumes	Quiet	Quiet; hard to break
Liquid; straw color	lighter than low-carbon steel has a cellular appearance	**	Has mirrorlike surface directly under flame	Liquid	Same color as unheated metal; very fluid under slag	Fluid under slag
Molten metal sparks	Sparks more freely than low-carbon steel	**	Tendency to bubble puddle solidifies slowly and may sink slightly	Like drops of water with oxidizing flame will bubble	Quiet	Quiet

experience is the best solution

†Due to white or light color and extremely light weight aluminum is usually easily distinguishable from all other metals; aluminum alloys are usually harder and slightly darker in color than pure aluminum.
 ††Weight, softness, and great ductility are distinguishing characteristics of lead.

that are to be oxy-acetylene welded, particularly in maintenance work. It has been copyrighted by the Linde company

MONEL METAL	NICKEL	LEAD††
 light gray	 almost white	white; crystalline
smooth; dark gray	Smooth; dark gray	Smooth; velvety; white to gray
very smooth; light gray	Very smooth; white	Very smooth; white
smooth edges	Smooth edges	Any shaped chip can be secured because of softness
can be con- tinuous if desired	Can be con- tinuous if desired	Can be continuous if desired
chips easily	Chips easily	Chips so easily it can be cut with penknife
spark very similar to nickel	 <i>Color-orange</i> Average length with power grinder— 12 in. Volume—very small wavy streaks No sparklers	No spark
slower than steel	Slower than steel	Very fast
becomes red before melt- ing	Becomes red before melt- ing	No apparent change
gray scum; con- siderable amounts	Gray scum; less slag than Monel metal	Dull gray coating
quiet; hard to break	Quiet; hard to break	Quiet
fluid under slag	Fluid under slag film	White and fluid under slag
quiet	Quiet	Quiet; may boil if too hot
all other		





Discuss Open Hearth Furnace Construction and Operation

THIS time, as a part of the general meeting of the American Institute of Mining and Metallurgical Engineers, the sixteenth semi-annual meeting of the Open Hearth Committee was held at the Stevens Hotel in Chicago, June 29 and 30.

The distractions of Engineering Week at the Century of Progress Exposition did not prevent this from being one of the best attended and most constructive of any of the sessions of this specialized group. Among all of the 141 members registered, an entirely different attitude from the previous meeting was in evidence. Instead of striving for an exchange of ideas on the ways and means of effecting intermittent operations with the least damage and expense, there was an interchange of experiences, already relegated to the classification of "past" as to the damage which had been caused to furnace bottoms, roofs, slag-pocket arches, etc., by those practices which had been so earnestly discussed and sought after a year ago. Once again interest centered upon production, furnace construction and operating procedure for best securing quality and economy.

L. F. Reinartz, of the American Rolling Mill Co., chairman of the committee, presided at the four sessions. No plant inspection tour was included, in order to allow the members more time for visiting the Century of Progress Exposition.

Stopper Rod Failures

The program opened with a report by H. V. Beasley, which gave the results of an investigation sponsored by the Mellon Institute on stopper rods. This report covered an investigation into the failures of the stopper head assembly, and by means of accurate temperature-time measurements of assemblies in general use, the effect of various sizes of rods, bolts, sleeves, keys, stopper-heads, the method of assembly, the materials from which they were made and the necessary materials for assembling were classified as to beneficial or detrimental elements and the quantitative effect in each case was accurately recorded. This was a valuable contribution to a hazy subject, not only for the knowledge it imparted, but also as a demonstration of a method of approach to a problem.

K. C. McKutcheon, American Rolling Mill Co., presented charts showing the results of combustion control, both manual and automatic, based upon the oxygen content of outgoing gases. He told in a broad way the benefits and difficulties of automatic control. The general discussion which followed resulted in no definite conclusions as to procedure for automatic regulation or economies involved, but the trend of opinion indicated that it was a desirable aid to operation of the furnaces and a development which should be furthered and studied.

Asserts Prepared Scrap to Be in Short Supply

The afternoon session of June 29 was opened with a talk by Benjamin Schwartz, director general of the Institute of Scrap Iron and Steel. He discussed the problems of the scrap industry from the collector's viewpoint, explained the economics of scrap and the scrap collector's position in the raw material supply for steel production. He stated that an actual shortage of prepared steel scrap now existed, there being only 1,000,000 tons or six weeks' supply now available in dealers' yards. The price of scrap, in the immediate past, he maintained, has partially destroyed the collection facilities of the country and the recent practice of the steel plants of buying directly from large producers of heavy scrap will, if continued, perpetuate those already crippled facilities and intensify an inevitable shortage.

He appealed to the open-hearth superintendents to assist in arriving at a mutually economic solution to the scrap collection and marketing problems, by defining their requirements in terms of specifications which can be adhered to, and to establishing where possible relative values for the different grades.

The discussion which followed indicated a complete willingness on the part of the members to cooperate with Mr. Schwartz's organization. It was indicated that scrap now represented probably 60 per cent of the open-hearth charge. After having expressions of opinion from various members, it was voted that a committee should be appointed for a study of all phases of the problems.

The remainder of the afternoon was

devoted to discussions of insulated roofs and other parts of the furnace, the effect upon operating procedure and life of refractories; the use of low iron and chromite bonded magnesite bricks and the making of steel with charges of all scrap and coke.

Proposed Sloping Front Wall

The Friday session was opened with a description of a proposed sloping front wall arranged by Mr. Rateau of the Weirton Steel Co. It embodied several extremely novel features, among them permanent hoppers for making up the front walls and banks, and the absence of the door jambs and arches. There being none of these yet in service, the benefits to be derived were speculative.

Dr. C. H. Herty, of the Bureau of Mines, described in detail the results of 12 heats of steel made at the plant of the Edgewater Steel Co. in which a control of the active iron oxide of the slag was successfully undertaken, using phosphorus as the indicator. He described the mechanics of the transfer of oxygen from the atmosphere of the furnace to the bath, and indicated the importance of the manner in which slag samples for analyses should be taken, if reliable, comparative results are to be obtained. He also presented a method for determining the fluidity of slags, which he stated to be far more accurate over a wider range of variability than any method used heretofore.

Claims Complete Deoxidization Harmful

C. E. Sims, American Steel Foundries, presented observations and supporting micrographs, on non-metallic inclusions, other than gas. Mr. Sims maintained that it was not the number of inclusions but their form which determined the properties of the steel. Globular inclusions, even when present in comparatively large quantities, have little effect upon the ductility, but when distributed in the boundaries of the primary crystals in a form he described as "eutectic," even slight quantitative amounts of such inclusion arrangement decreases to a marked degree the steel's ductility and resistance to shock.

Other micrographs showed the increased size of globular inclusions oc-

Mr. Sims believes that most inclusions are in solution and that their solubility decreases rapidly as the freezing point of the steel is approached. Further, that iron oxide in the steel aids in the formation of those silicate inclusions most likely to assume a globular form, and, therefore, least harmful. On this basis, he maintains, complete deoxidization of steel is harmful to its physical properties.

Mr. Washburn, Inland Steel Co., co-author, then read a paper for Hunter Neade, on some observations in the manufacture of rimming steel ingots. Slides of split ingots, showing the internal structure and location of blow holes, were used to illustrate the points brought up. They have found that the ratios of lime, silica and iron oxide in the slag affect the results, as does also the length of the ingot. They also consider the charge, and the materials of the charge, important. Their thoughts as to the best practice for deep drawing steel were presented in detail.

A paper by W. C. Buehl on some principles to be followed in the construction of a 150-ton furnace dealt comprehensively with the problems of insulation. The requirements of insulating materials in characteristics other than insulating value were stressed and caused considerable discussion among the members, as did also the refractory problems introduced by insulation, and the salvage value of the material itself.

THE accompanying tables of permissible variations in the sizes of commercial quality hot-rolled and also cold-finished bar steels and shafting will replace corresponding tables in the existing specifications for the material of the American Society for Testing Materials. The annual meeting of the Society in Chicago so ordered.

In the case of the hot-rolled bars, the revisions are intended to harmonize the cross-sectional tolerances with those recently adopted by the Association of American Steel Manufacturers. In the case of the cold-finished bars and shafting, the tolerances are intended to accord with those of the Cold-Finished Bar Institute.

Round and Squares					Hexagons				
Sizes Specified, in.		Variations in Size, in.			Sizes Specified Between Opposite Sides, in.		Variations in Size, in.		
Over	To and Including	Under	Over	Out of Round or Square	Over	To and Including	Under	Over	Difference Three Measurements
..	$\frac{1}{8}$	0.007	0.007	0.010	..	$\frac{1}{2}$	0.007	0.007	0.011
$\frac{1}{8}$	$\frac{1}{8}$	0.007	0.007	0.011	$\frac{1}{2}$	1	0.010	0.010	0.015
$\frac{1}{8}$	$\frac{6}{8}$	0.008	0.008	0.012	1	$1\frac{1}{2}$	0.013	0.021	0.025
$\frac{3}{8}$	$\frac{7}{8}$	0.009	0.009	0.014	$1\frac{1}{2}$	2	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{3}{8}$
$\frac{3}{8}$	$\frac{7}{8}$	0.010	0.010	0.015	2	$2\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{7}{8}$	1	0.012	0.012	0.016	$2\frac{1}{2}$	$3\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
1	$1\frac{1}{8}$	0.014	0.014	0.018					
$1\frac{1}{8}$	$1\frac{1}{4}$	0.016	0.016	0.022					
$1\frac{1}{4}$	$1\frac{3}{8}$	0.018	0.018	0.025					
$1\frac{3}{8}$	$1\frac{1}{2}$	0.022	0.022	0.030					
$1\frac{1}{2}$	2	0	$\frac{1}{8}$	$\frac{1}{8}$					
2	$2\frac{1}{2}$	0	$\frac{1}{8}$	$\frac{1}{8}$					
$2\frac{1}{2}$	$3\frac{1}{2}$	0	$\frac{1}{8}$	$\frac{1}{8}$					
$3\frac{1}{2}$	$4\frac{1}{2}$	0	$\frac{1}{8}$	$\frac{1}{8}$					
$4\frac{1}{2}$	$5\frac{1}{2}$	0	$\frac{1}{8}$	$\frac{1}{8}$					
$5\frac{1}{2}$	8	0	$\frac{1}{8}$	$\frac{1}{8}$					

Width of Flats Specified, in.		Variations in Width, in.		Variations in Thickness, Under or Over, in., for Thickness Specified			
Over	To and Including	Under	Over	$\frac{1}{8}$ or Under	Over $\frac{1}{8}$ to $\frac{1}{2}$, incl.	Over $\frac{1}{2}$ to 1, incl.	Over 1 to 2, incl.
1	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	0.006	0.008	0.010	..
1	$\frac{3}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	0.008	0.012	0.015	$\frac{1}{8}$
2	1	$\frac{3}{8}$	$\frac{3}{8}$	0.010	0.015	0.020	$\frac{3}{8}$
4	2	$\frac{3}{8}$	$\frac{3}{8}$	0.010	0.015	0.020	$\frac{3}{8}$

Carbon 0.30 Per Cent and Less		Carbon 0.31 to 0.50 Per Cent	
Under	Over	Under	Over

Up to	1 in., inclusive	0.002	0	0.003	0
Over	1 to 2 "	0.003	0	0.004	0
"	2 to 4 "	0.004	0	0.005	0
"	4 to 6 "	0.005	0	0.006	0
"	6 to 8 "	0.006	0	0.008	0

Specified Dimensions Between Opposite Sides				
Up to	0.3	in., inclusive	0.002	0
Over	0.3 to 1	" "	0.003	0
"	1 to 2½	" "	0.004	0
"	2½ to 4	" "	0.005	0
"	4 to 6	" "	0.006	0

Specified Dimensions							
Up to	0.3	to 0.3	in., inclusive	0.003	0	0.004	0
Over	0.3	to 1	"	0.004	0	0.005	0
"	1	to 2½	"	0.005	0	0.006	0
"	2½	to 4	"	0.006	0	0.008	0

Specified Thicknesses	Variations in Width and/or Thickness, in.					
	For Widths Less Than 1½ in.		For Widths 1½ to 4 in., inclusive		For Widths Over 4 to 6 in.	
	Under	Over	Under	Over	Under	Over

Up to	0.3 in., inclusive	0.003	0	0.005	0	0.008	0
Over 0.3 to 1	" "	0.004	0	0.005	0	0.009	0
" 1 to 2½	" "	0.005	0	0.006	0	0.010	0

Up to 0.3 in., inclusive.....	0.004	0	0.006	0	0.010	0
Over 0.3 to 1 " ".....	0.005	0	0.006	0	0.012	0
" 1 to 2½ " ".....	0.006	0	0.008	0	0.012	0

Behavior of Metals During Cutting

Investigated at Length

PROMINENT in the sessions of the machine shop practice division of the American Society of Mechanical Engineers was a paper by Prof. Friedrich Schwerd, Hanover, Germany, describing elaborate research work covering actual conditions during cutting of metals.

Prof. Schwerd said that two things contributed largely to the success of his work: first, the development of a technique which made it possible to take photographs with an exposure of 1/5,000,000 second, and second, the development of the tungsten-carbide cutting materials which made it possible to study the action on the chip throughout a wide range of feed and speed.

Much interest attached to Prof. Schwerd's description of the photographic technique which made such extremely short exposures possible. He said that the source of light for the work called for the expenditure of 1,000,000 hp. for a minute interval of time. The experimental work not only included a series of photographs taken throughout actual machining operations, but also by means of extremely sensitive photo-thermal recording apparatus covered an analysis of the instantaneous temperatures at various points in the chip and in the metal during the cutting.

Work Has Three Aims Including Study of Best Finish

Prof. Schwerd said that while his work had developed to a point where it displayed a good deal of interest, there still remains the difficult job of translating the results into economies in commercial machine shop practice. In general he was trying to determine three features in metal cutting: (1) how to obtain the best finish; (2) what was needed to give the closest tolerance, and (3) how to do the cutting most economically. Heretofore determination of the best cutting speed has usually been a matter of trial and error. Now, by collecting elaborate data concerning temperatures and appearance during actual operations under different conditions and with different metals, Prof. Schwerd feels he has the basis for some valuable further research work. By studying the chip in motion, to determine the way it breaks off from the metal and the behavior of the metal itself, it is easy to get a clear graphic determination of the optimum rates of speed and depths of cut. Some authorities heretofore have

thought that the tool angle was most important in determining the shape of the chip, but Prof. Schwerd states this is not so, but that the speed and depth of cut are more important. He feels that Mr. Taylor in his classical treatise of many years ago was not quite right in locating the point that the chip shears, for the speed photographs show clearly that shear takes place at or close to the point of the tool, and not farther up the shank as heretofore believed.

Best Cutting Temperature

In the range of temperature developed in different metals in cutting, there is usually one place where the machineability is most favorable and the trick in correct use of machine tools, according to Prof. Schwerd, is to use a feed, depth of cut, and design of cutting tool which will develop this temperature of maximum machineability. For instance, using a standard stainless steel, Prof. Schwerd found that with a feed of 5 meters per min. under certain conditions he got a rough surface and a ragged shearing chip, but by keeping other conditions the same and increasing his speed to 20 meters per min., he secured a perfectly smooth surface and a good flowing chip.

A series of photographs which was thrown on the screen showed what is probably a clearer demonstration of the built-up nose in cutting than has been heretofore available in America. The investigation at Hanover confirmed Prof. Schwerd's theory that in cutting metal there is a constant recurring cycle in the development of the built-up nose. The cutting starts without a built-up nose, the built-up nose then gradually develops to a maximum point, after which it sloughs away, and the process is repeated. By his photographic study, he was able to determine the exact interval from the point of one maximum built-up nose to another. In one of the cases shown with a standard steel, this interval was about a fifth of a second, and was exactly the same interval as represented by minute cracks in the chip.

At relatively slow cutting speeds, the photographs showed considerable deformation of structure in the metal ahead of the cutting tool, and extending in some cases throughout an appreciable area into the base metal. As speeds increased, this disturbance of grain structure narrowed down until at high speed and under best cutting conditions there was practically no grain disturbance ahead of the tool.

This, Prof. Schwerd said, was due to the fact that the cutting action was so rapid that there was no time for the grain structure to bend in the direction of the cutting, as was the case at slower speeds. The experimental work included extremely high speeds.

Similar changes in the amount of deformation of the grain structure occurred with variation in the depth of the cut when the rate of feed was held constant.

One important factor in metal cutting, and one which machine tool builders in this country have realized for several years is the rigidity of the machine tool itself. Some of the photographs shown indicated the advantage of an extremely rigid tool. In cases where the standard tool at a certain speed produced a shear chip, the more rigid tool, with conditions otherwise exactly the same, produced a smooth flowing chip.

Temperature Range Wide

Experiments in the field of temperature determination showed wide range from the temperature of the unaffected metal to the highest point in the moving chip. Prof. Schwerd said that his final tables and charts were the result of a great many experiments made to avoid the possibility of error. One chart, which was in effect a cross-section of a tool during cutting, gave the temperature at perhaps 50 different points. The highest point of about 500 deg. C. was on the chip just after it had been cut from the metal. Another hot point was in the metal itself, a few millimeters ahead of the built-up nose.

Research in Milling

Some results of American investigators in the field of metal cutting were described in a paper on "Elements of Milling," by O. W. Boston and C. E. Kraus, University of Michigan. Part of this investigation was to determine the energy required in making milling cuts under various conditions. The machine used for testing had a weighted pendulum which swung down a definite distance and encountered a mechanism which caused an accurately measurable cut to be made. The pendulum then swung on beyond and a reading of its final position represented the absorbed or used energy in foot pounds. The design of the machine was such that it was a simple matter to read directly the energy required to cut with a standard milling cutter a definite weight of metal. For all of the work a soluble oil cutting fluid was used and the materials included brass and three different steels. With a standard milling cutter the action was smoother when the cutter was operating on a down cut than when it was reversed and used for the so-called up cut. Also, less energy was required in cutting down, when conditions were otherwise the same. The investiga-

tion covered variations in feed, depth of cut, and angle of cutting tool.

Professor Boston said that the shape of the angle of the tool affected directly the energy required. Variations ranging between a right angle and a razor blade were tried and the point of lowest power fell somewhere between these two. For brass, a tool with a 20-deg. front angle gave the lowest value. In milling, results showed that an axial load type of cut was less efficient than a radial load cut.

Three Types of Cemented-Carbide Tools

THREE types of cemented-carbide tools—tungsten carbide, tantalum carbide and tungsten-tantalum carbide—are in commercial use today, according to Malcolm F. Judkins, Firth-Sterling Steel Co., McKeesport, Pa., in a paper prepared in cooperation with William C. Uecker, also of the Firth-Sterling company. The three types have different characteristics and each has certain advantages under some conditions. Mr. Judkins emphasized the important part which tool design plays in the use of any of the tungsten-carbide tools. His company has found that while cemented tungsten carbide is best for machining cast iron and many non-metallic materials, it does not successfully machine some types of steel, as the lip surface quickly develops a deep chip cavity accompanied by intense heat at elevated cutting speeds. The addition of tantalum carbide gives a toughness to the alloy and greatly delays the formation of a chip cavity, and also gives a definite cooling influence. In the design of the cemented carbide tools, the difference in the coefficient of expansion between steel and the hard-cutting alloy is apt to give trouble unless taken into account. Also, it is important to keep in mind in the original design, provision so that re-grinding does not change the cutting action. In some cases he found that chamfering increased the tool life by 60 per cent.

Asked if for each design of tool there was an optimum of speed and feed, Mr. Judkins said that all those using cemented-carbide tools had to recognize at the start that they could not be used successfully for taking unusually heavy cuts. The field of greatest usefulness, therefore, lay in

the direction of rapid feed, and this, as previously pointed out, was not always the most efficient way of removing metal. A determining factor often is one of surface finish and life of tool between grinds, rather than actual cutting efficiency.

Life of Cemented-Carbide Tools

Regarding the proper life of a cemented-carbide tool, Mr. Judkins cited the practice of the Westinghouse Electric & Mfg. Co., which limits use of a cemented-carbide tool to 30 min. This he said was on regular commercial work and where simple tools were used. Exceptions might be made in the case of tools difficult to regrind, and of course milling cutters would not come into this classification at all. It takes from 2 to 4 hr. to regrind a cemented-carbide milling cutter, while 15 min. is required for a simple cutting tool. In general, Mr. Judkins said, the actual life of a tool would have to be determined in each case by the many conditions encountered by the user. He advocated keeping close records of the number of pieces cut. Some users have a fixed number of pieces recorded by an indicating counter which gives a signal when the quota is reached. In starting new work a careful inspection in four or five cases will usually determine the proper life of a tool. With castings, this is determined by watching when slight chipping of the edges occurs. Asked if there were not cases where finishing by grinding would be cheaper than the use of cemented-carbide tools, where high finish was the chief consideration, Mr. Judkins pointed out that in a great deal of fine work, such as airplane-engine parts, two operations were necessary with grinding, that is, after grinding, the parts must be thoroughly washed to remove the grit. However when milling these same parts with a cemented-carbide cutter, the surface is clean and needs no washing.

Asked whether a watt-meter reading would give an indication of the condition of the cutter, Mr. Judkins said that for cast iron it would not, as the power did not seem to increase with the dulling of the cutting tool. With steel, however, a watt-meter reading might give a very good indication of the tool condition. Prof. O. W. Boston, University of Michigan, in citing some of his experiences said he found that cemented-carbide tools

failed for one of four reasons: either the tip separated from the shank, or started to spaul, or wore down due to abrasive action, or softened. He said he found the front angle very important in the development of a built-up nose which would protect the lip surface of the tool. He said further that most commercial users failed to operate at sufficiently high cutting speeds when using cemented-carbide tools, and that many still adhered to the tool design developed by users of high-speed steel. Instead of the standard blunt nose-cutting tool. He showed a design with a long oblique face which would give a thinner but longer cut, and he said with this design it had been possible to increase the operating speed by 60 per cent or, keeping the speed the same, it had been possible to increase the life of the tool a hundredfold or more.

C. J. Oxford, National Twist Drill & Tool Co., Detroit, asked whether the authors of the paper had had any experience with the use of cemented carbide tips on twist drills. To this Mr. Judkins replied in the negative, stating that as there are so many difficulties in the way no successful development in this direction has been made. He thought, however, that it was a future possibility.

X-ray Inspection Discussed

New uses for X-ray in the metal-working field have developed recently according to Herbert R. Isenburger of the St. John X-ray Service Corp., New York, who presented a paper on "X-ray Inspection of Welds." He told of recent development of X-ray paper, which is faster and about half as expensive as film. It was brought out in the discussion, however, that the boiler code does not as yet permit the use of X-ray paper on the inspection of welds in pressure vessels. Mr. Isenburger described a new portable X-ray inspection set occupying about one-fourth the space of previous portable sets, with greatly increased power. He said that in most cases the use of radium for testing showed no advantage over X-ray and was more hazardous. He said, however, that in examining circumferential seams radium, which acted in all directions, could be placed at the center of a vessel and the sensitized paper or film placed around the exterior so that the entire seam could be examined with one exposure. Mr. Judkins asked whether the X-ray could be used for inspection of cemented carbides, to determine relative density. Mr. Isenburger thought this could be done, although he had no actual experience.

Asked whether the new portable X-ray set could be placed inside of a boiler and thus increase the area of each exposure, Mr. Isenburger said that in boilers of approximately 12 ft. diameter this had been done successfully and that an exposure often took in $\frac{1}{4}$ the circumference.



What Industrial Marketing Means

"**M**ARKETING means something more than personal selling—more than advertising—more than sales promotion—more than merchandising. It embraces all of these functions and often others in addition," said William L. Rickard, president, Rickard & Co., New York, in addressing the National Industrial Advertisers Association in Chicago last week.

"First there is market research, which is the job of going out into the field and gathering all the facts about a market—its size, its needs, its buying habits, its preferences. Then there is the taking of these facts and figures and organizing and analyzing them. Then interpreting them to find out whether the market is growing, or shrinking or standing still—whether the product accurately meets the needs and preferences of the market. The larger a market in individual buyers, the less personal and direct sales contact needed, the greater the need for frequent and thorough market research. The purpose of research is to show you what to do and how to do it.

Product Design—Its Influence on Sales

"Then there is the question of product design, for this has a definite bearing on the success or failure of sales work. Regardless of the technical merit of a product, if it does not adequately meet the needs and preferences of a market, the seller will labor under a handicap in making sales."

In connection with product design, Mr. Rickard stressed the contribution that the trained artist-designer is making toward increasing the sale of certain makes of the many products used by industry. In the contacts that he has had recently with several of the leading designers, he has found them to be intensely practical and surprisingly sales-minded. Since product design bears such a definite and direct relation to sales, it should be considered as one of the functions of marketing.

Under the heading advertising there should be included the use of every form of media used to carry the story of a product to an unseen market. Profits obtained from advertising bear a direct relation to the knowledge, intelligence, and skill in its preparation, and in the selection of media. Message and media are equally and vitally important.

Industrial marketing demands the help of advertising today more than

ever before. The industries to which products are sold are honeycombed with obsolete and inefficient equipment. Modernization on a large scale in the near future is inevitable. Profits cannot be made with much of the equipment now installed. Then too, we are swiftly approaching a period of widespread automatic mechanization and control in industry such as we never before have known. This will be forced upon us by the existing trend toward shorter working hours and the necessity for making profits in a shorter working day.

Still another force that is working to bring about re-equipment in industry is the inflexibility of the mass production principle which has been so widely adopted during the past decade or two. It cannot operate at a profit except on large volume throughput. Mass production may be a boon time bonanza but when sales are depressed it is a prolific breeder of deficits. Mass production must give way to some flexible production principle, one that is profitably adaptable to varying volumes of business.

Just what production principle finally will be adopted is not now determined. It may be what might be termed a multiple unit principle of production. That is instead of operating on a production system requiring an excessively large throughput to operate profitably, there will be a number of complete production units of smaller size, which can be thrown into, or out of, operation as may be required.

On the other hand, some industrial engineers believe that the day of the gigantic manufacturing establishment is about over, and that the solution of the flexibility problem will take the form of a number of smaller manufacturing plants distributed at various points throughout the country. Whatever the principle that is adopted, much new equipment will be required.

Market of Today Not That of the "Twenties"

In this new period of industrial change and rehabilitation, advertising has a big job to perform. Manufacturers must realize that the industrial market of today is not the same market as that of the twenties. In-

dustries are made up of people. In other words markets are people. People retire, lose their jobs, are transferred, die. This process goes on under all business conditions, but it is tremendously accelerated during a period of business depression such as that from which we are now emerging. This change has been so great and so widespread that many if not most of the contacts built up over a long period of years have ceased to be of value. At the end of 1932 only 35 per cent of the half million subscribers to a group of business publications were in the same jobs, and at the same locations, as in 1931. New contacts must be made and made quickly.

Those selling to industry have a new market to cultivate. A new group of people numbering tens of thousands from top executives down. It would be dangerous to assume that these thousands of individuals know a company's products, or that they are acquainted with its long record of success.

Dust Control as a Health Measure

THE most important industrial dusts which of themselves are not toxic, but which tend to cause lung disabilities, contain in some measure silica (SiO_2) in a free state, declared J. M. Dalla Valle, United States Public Health Service, in a paper presented at the Chicago meeting of American Society of Mechanical Engineers. It must not be concluded, however, that other dusts which do not contain free silica are harmless. In fact, there are now data available to show that other inorganic dusts cause disability.

It is agreed that only particles below 10 microns in size are of major physiological importance. Most industrial dusts do not appear to have diameters much less than 0.5 microns. Of the many industrial dusts examined by the author no sample showed an average particle diameter of less than 1 micron. This strongly suggests that the usual processes causing dust as waste products do



not produce particles of an extremely small size. It also strengthens the opinion held by many that the Greenburg-Smith impinger apparatus for collecting dust samples gives accurate results of the dust present in the air where the sample is taken.

The control of industrial dusts depends upon the nature of the process causing the dust. Control may be achieved by several methods, including wetting of the source, general ventilation, and local exhausts using hoods.

Of these methods, the last mentioned is perhaps the most important. Local exhaust is not only adapted to a wide range of conditions, but is useful in carrying away to a central

collecting system all the dust generated. Broadly speaking, dust control by means of hoods can be obtained by either partial or complete inclosure, as with grinding wheels. With sources using partial inclosure for their control, due consideration must be given to the method of dust formation and the air velocities required to bring the particles within the control of the hood. Once the control velocities have been established, it is then necessary to design a hood whose velocity characteristics completely embrace the dust area. This indirectly establishes the requisite air volume for the system. Hood velocity characteristics form an important link in the solution of the dust problem in industry.

Short Time Testing of Metals to Ascertain Endurance

SHORT time testing of ferrous and non-ferrous metals to determine endurance limits was one of the subjects discussed at the meeting of the American Society for Testing Materials and aroused a great deal of interest. This matter was presented in a paper by Prof. H. F. Moore and H. B. Wishart, University of Illinois, and read by the latter at a session that considered fatigue of metals, committee reports and other topics. In the absence of the chairman the session was presided over by the honorary chairman, Dr. Herbert John Gough, superintendent engineering department, National Physics Laboratory, England.

In conducting the "over-night" tests, as the short time test method is designated, several specimens after being given the Rockwell hardness test were placed in a rotating beam machine and subjected to about 1,400,000 cycles of stress requiring 15½ hours for machines running at 1500 r.p.m. The stresses for the different specimens covered a range of values on both sides of the estimated endurance limit. After removal from the fatigue machines the tensile strength is noted. For specimens that have been subjected to cycle stress below the endurance limit the tensile strength will be increased or unaffected and for specimens showing fatigue damage the tensile strength will be reduced. The theory on which this test was based is that under cycles of repeated stress metals are subjected to two opposing tendencies: (1) a tendency to increase of strength due probably to cold work and (2) a tendency to loss of strength due to spread of fatigue damage by cracks.

The method was checked against long time fatigue tests of both ferrous and non-ferrous metals. Mr. Wishart stated that cold drawn steel

showed the best results and duralumin the poorest.

While the discussion brought out skeptical views regarding short time testing, the method presented was characterized as ingenious and one that might prove useful and the opinion was expressed that it should be exploited further. R. L. Templin, Aluminum Company of America, expressed the belief that short time tests could not be provided for light alloys as discordant results might be obtained from different alloys and that it would be hazardous to use short time tests for aluminum alloys. E. H. Dix, Jr., Aluminum Company of America, said that the test might be used as a pilot test and is of interest to one developing a new alloy, pointing out that the accelerated corrosion test is often used to advantage. Dr. Gough expressed doubt that the short time testing method would give satisfactory results. He pointed out that for tests of this character the best materials are used and he suggested that the test be conducted with ordinary commercial steel and a wide range of material. Professor Moore said that the method of testing really was not a short time method but a compromise between short time and long time testing.

Fatigue Tests and Properties

FATIGUE tests of galvanized wire under pulsating tensile stress was the subject of a paper, not preprinted, prepared by S. M. Shelton and W. H. Swanger, U. S. Bureau of Mines, and presented by the latter. This described a rotating beam method employed in making tensile tests of heat treated and cold drawn wire. Results of these tests were tabulated. A gripping device designed for holding the wire so that fracture would not occur in the gripped section was ex-

plained. Discussing the effect of galvanizing on fatigue in his concluding statements Mr. Swanger said that galvanizing reduces the endurance limit of wire.

The fatigue properties of light metals and alloys was the subject of an excellent paper presented by R. L. Templin, Aluminum Company of America. This proved of much interest and brought out some discussion. The author emphasized the need of more comprehensive knowledge of the strength of metals under various kinds of repeated stresses and described fatigue tests made by his company and types of apparatus used in conducting the tests. The fatigue tests made at the Aluminum Research Laboratories included the rotating beam, repeated flexure for sheet, direct tension and compression, combined tension and bending type for wire and cable, corrosion-fatigue, repeated impact and repeated bending for small tubing and fittings. Among the machines used was a new design of direct tension and compression machine that tests four specimens simultaneously. Another was a large rotating beam testing machine that will handle specimens 2 in. in diameter and still another, a high temperature rotating beam machine designed to operate at a maximum of 600 deg. Fahr. The author presented fatigue data for wrought and cast light aluminum alloys and for several magnesium alloys. Data from the rotating beam test indicated that the higher values of the endurance ratios for pure metals or those of low alloy content in the annealed wrought condition are analogous to similar values found for low carbon, hot rolled or annealed steel. In every case the endurance limit was greater than the yield strength value. Cold working was found to increase the fatigue strength but the increase was not in direct proportion to the increase in tensile strength. Heat treatment of heat treatable aluminum alloys was found to have a beneficial effect on their fatigue strength. Comparison of fatigue tests on light alloys, the author said, indicated that results should be based on the 500 million cycles of stress. Tests based on a comparatively small number of cycles of stress can give misleading results. Tests made in foreign laboratories are based on a much shorter number of cycles and show a much higher endurance limit.

Committee Recommendations

THE relative merits of film and paper for industrial X-ray work were discussed by Ancel St. John and H. R. Isenburger, St. John X-ray Service Corp. Their conclusions were that paper is better than film both from the standpoint of convenience and cost.

Committee E-1 on Methods of Testing reviewed the activities of the technical committees during the year. The committee recommended that the

revision in tentative methods of testing metallic materials previously published be referred to letter ballot for adoption, that a revision of the tentative methods of compression testing be accepted for publication as tentative, that tentative methods for testing thin sheet metals be adopted as the standard, and that revised methods of calibration of testing machines which have been prepared be published as tentative to replace the present standard method which was

thought too lenient. The report was adopted.

Committee E-4 on Metallography recommended that the tentative recommended practice for thermal analysis of steel be approved.

Professor Moore gave an informal report of the research committee on fatigue of metals, outlining the activities for the year. This committee, he said, is not attempting at present to prepare any standards.

Testing Engineers Revise Methods of Determining Corrosion

CORROSION of metals was the general topic of discussion at one of the sessions of the American Society for Testing Materials at its annual meeting in Chicago last week. Two papers and several committee reports were presented.

Consistent data showing the influence of water velocity and time on the corrosion of iron was the subject of an interesting paper by R. F. Passano and F. R. Nagley, American Rolling Mill Co., Middletown, Ohio, and read by the former. The authors described the influence of water velocity and time in an immersion test. This showed that iron specimens exposed to water at high velocity at first lose more weight than those exposed at low velocity but that in the long run the specimens exposed at the higher velocities probably will lose less weight than those exposed at the lower velocities.

Corrosion resistance of structural aluminum was the subject of a paper by E. H. Dix, Jr., Aluminum Company of America. Stating that heretofore corrosion tests of aluminum have been largely with thin sheets the author gave the results of the resistance to corrosion of the larger full sized structural shapes of aluminum alloys of the duralumin type subjected to outdoor exposures for periods up to five years and to accelerated exposures. The structural engineer, he pointed out, is interested primarily in the possible effect of corrosion in reducing the strength of structures and hence from his viewpoint the most satisfactory method of evaluating corrosion resistance is to compare the strength of structural parts before and after various corrosive exposures.

The author tabulated the following conclusions from results obtained regarding the corrosion resistance of structural aluminum: Corrosion of duralumin type is practically self stopping, and the depth of the penetration is independent of the thickness of the section. Therefore tension tests on thin specimens after exposure to short time test conditions give a misleading conception of the corrosion resistance of heavier sections. A study of changes in the chemical properties of tensile speci-

mens after exposure to corrosive conditions shows that the yield strength is less effective than the tensile strength, and the losses in tensile and yield strengths and elongation tend to approach a limit beyond which they do not drop appreciably even when the exposure period is doubled and this limit is higher the thicker the section. Sections 0.2 in. and thicker show unimportant structural losses even after extended exposure to very severe corrosive conditions. No appreciable losses in load supporting ability in beams and columns occurred under severely corrosive conditions which caused marked losses in mechanical properties of thin sheet specimens.

Dr. L. B. Tuckerman, Bureau of Standards, in a written discussion said that tests by the Bureau on aluminum sheets and tubes indicated that corrosion decreased as thickness increased and that corrosion slows down in time.

Committee Recommendations

REVISION of the standard method of determining the weight of coating on galvanized iron and steel sheets and wire was recommended by Committee A-5 on corrosion of iron and steel. This committee also recommended that four tentative revisions covering zinc coating of wire products be advanced to succeed present standard specifications. These revisions cover telephone and telegraph line wire, tie wire, wire cable and fence fabric galvanized after weaving. All the recommendations were approved. The report included the results of extensive field tests of the coating on galvanized products made by a sub-committee. Results of inspections of coated hardware, structural shapes and tubular goods made at five test locations after four years' exposure were given in a series of tables. Tabulations resulting from investigations of galvanized sheets confirmed previous findings that the relative resistance of zinc and iron changes with location.

A progress report was made by committee A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys, through its chairman, James

Strauss, Vanadium Corporation of America. A sub-committee is assembling data on alloys belonging to the plain iron-chromium group and later will give attention to other groups. The sub-committee on welding had prepared a recommended practice for inspection of welds in iron-chromium and iron-chromium-nickel alloys for particular use in inspecting welded tanks. The report was accepted subject to letter ballot.

Committee B-3 on the corrosion of non-ferrous metals and alloys has carried on an extensive program of corrosion tests in the field during the past year and its chairman, T. S. Fuller, General Electric Co., submitted an exhaustive report. The sub-committee on atmospheric corrosion of non-ferrous metals and alloys of which W. H. Finkeldey, Bureau of Standards, is chairman, presented detailed results on tests made with 24 non-ferrous metals and alloys using 9 x 12-in. plate specimens, after exposures of one year at nine test locations representing that number of types of atmospheric conditions. The data showed the changes in weight, tensile strength and elongation that the materials underwent during one year's exposure. Visual examination showed marked differences in the corrosion product films due to differences in the atmosphere. Test data showed that New York City has as corrosive an atmosphere as any other industrial points where tests were made.

Revision of the standard specifications for zinc (hot galvanized) coatings on structural shapes, plates and bars and their products as recommended by a sub-committee last year was recommended by the sectional committee. The revised specifications were formally approved.

Cierva Honored on Engineers' Day

A HIGH point of Engineers' Day, June 28, at the Century of Progress Exposition, Chicago, was the presentation of the 1932 Daniel Guggenheim medal to Juan de la Cierva for "development of the theory and practice of the autogiro." Presentation was made at Soldiers' Field, an open air stadium, which well afforded the limited space required for an impressive landing of an autogiro, which bore Juan de la Cierva to the ceremony.

The address of welcome was made by Harry B. Gear, president, Western Society of Engineers, as chairman of the Engineering Societies Committee, 15 societies being represented. Presentation of the medal was made by Edwin E. Eldrin, chairman, Daniel Guggenheim Medal Board of Award.

This medal was created for the purpose of honoring persons who make notable achievements in the advancement of aeronautics. It is also a com-

memoration of the support given by Daniel Guggenheim to the advancement of aeronautics through donations for the support of schools of aeronautics and for the encouragement of civil aviation.

Provision for the medal was made in 1928 by the gift of a fund from the Daniel Guggenheim Fund for the Promotion of Aeronautics. To receive and administer this fund the Daniel Guggenheim Medal Fund, Inc., was organized in 1927 under the laws of New York. Half the members of this corporation are members of the American Society of Mechanical Engineers and half are members of the Society of Automotive Engineers. The board of award is international. It has for members the eight directors of the corporation and one member each from Canada, England, France, Germany, Holland, Italy and Japan, designated by a leading aeronautical organization in each country.

The Daniel Guggenheim Medal for achievements in aeronautics was first presented in 1929 to Orville Wright with the citation "For design and construction, with his brother now deceased, of the first successful engine-propelled airplane."

Juan de la Cierva was born at Murcia, Spain, Sept. 21, 1895. He was educated in Spain and was graduated from the Special Technical College in Madrid in 1919.

Cierva began the development of the autogiro, both theoretically and experimentally, early in 1920. It was not until early in 1922, after considerable experimentation, that he developed the successful autogiro of today. In 1925 the autogiro had been demonstrated so successfully that its manufacture was taken up by a British concern. In 1929 the Autogiro Co. of America began the marketing of this type of plane.

O'Leary to Head New Machinery Institute Under Industrial Recovery Act

FEDERATION of the machinery interests of the country to meet the problems arising under the new National Recovery Act will create an organization to rank among the five largest trade bodies in the United States. The new alliance, to be known as the new Machinery and Allied Products Institute, will be headed by John W. O'Leary, president Arthur J. O'Leary & Son Co., Chicago. It will make its headquarters in that city, will coordinate the activities of a widespread number of trade organizations and industries having a collective working force of about 350,000 men and representing capital investment and yearly sales of approximately three and one-half billion dollars.

The new Institute will represent practically all American machinery builders, with the exception of those already allied with the Iron and Steel Institute and those aligned with the railway equipment, automobile, steamship and electrical manufacturing bodies.

Organization of the new Institute followed several weeks of deliberations by leaders in machinery circles from every section of the country.

The committee on organization which is headed by George H. Houston, president of the Baldwin Locomotive Works, also includes Philip Morgan, Morgan Construction Co.; Paul DeWolf, Brown & Sharpe Mfg. Co.; George Doubleday, Ingersoll-Rand Co.; W. S. Elliott, The Elliott Co.; N. W. Pickering, Farrel-Birmingham Co.; P. E. Bliss, Warner & Swasey Co.; Jacob Cox, Cleveland Twist Drill Co.; E. A. Muller, King

Machine Tool Co.; Fred Geier, Cincinnati Milling Machine Co.; Max Babb, Allis-Chalmers Mfg. Co., and P. C. Brooks, Fairbanks, Morse & Co.

Another committee that is expected to play an important part in the new body is the committee on finance. Its membership includes Col. R. H. Morse, Fairbanks, Morse & Co., chairman; W. C. Dickerman, American Locomotive Co.; W. S. Elliott, The Elliott Co.; George B. Torrence, Link-Belt Co.; E. K. Swigart, Bucyrus-Erie Co.; George A. Rentschler, General Machinery Corp., and E. A. Muller, King Machine Tool Co.

Organization of this new and important institute will not replace any of the existing trade associations in the machinery field. Instead, these functioning bodies, some of which have individually as many as 3500 industry members, will continue their own autonomy. The main difference will be that these previously existing and highly specialized associations will look to the Machinery and Allied Products Institute for coordination and general policy guidance in mat-

ters affecting the machinery industry as a whole.

The diversity of the interests involved is indicated in the fact that the new Institute will probably represent, among others, America's manufacturers of boilers and steam generators, canning machinery, concrete machinery, compressors, conveyors, cranes, cotton gins, dairy machinery, dredges, elevators, foundry machinery, gas machines, machine tools, mining equipment, oil refinery machinery, packing house machinery, pneumatic machinery, printing machinery, pumps, rolling mill machinery, textile machinery and woodworking machinery. In the allied products field, it will likely be the spokesman for producers of belting manufacturers and makers of emery wheels, files, engines, refrigerating machinery, industrial lighting fixtures and fire extinguishers.

Mr. O'Leary's attitude in assuming presidency of the new Institute is reflected in the following statement, "Under the new laws so directly affecting industry, business must organize on a larger scale than ever before. There can be no shirking of leadership. It rests with our industry to make for our employees, and all others whose interests are bound up with our own, the most of the possibilities which the National Recovery Act affords. My personal gratification in being selected to lead the new Institute in no way detracts from my consciousness that if business fails to measure up to its impending responsibilities, the alternative will be confusion, and possible Government intervention."

Tapered Roller Bearings Simplification

A revised draft of simplified practice recommendation R67 covering tapered roller bearings, which was prepared by the standing committee of the industry, has been mailed to all interests in the industry by the division of simplified practice of the Bureau of Standards.

In addition to bringing the simplified practice recommendation into accord with the Society of Automotive Engineers revised standard for tapered roller bearings, the proposed revision covers sizes up to 12-in. bore together with certain steep angle bearings for naval and general use.

The revised schedule is to be effective one month after announcement by the Department of Commerce that the required degree of support has been recorded.

McClintic-Marshall Corp'n. has closed its San Francisco offices and plant, which have been consolidated with its Alameda plant, just across San Francisco Bay.



Current Trends and Expectations in The Metal-Working Industry—Part 2

A Survey by The Iron Age

THIS is the concluding installment of the results of an original survey by THE IRON AGE, the first part of which was published on pages 1031 to 1038 of the issue of June 29.

The purpose of this survey was to secure first-hand information as to the trend of volumes of business, during the past few months, of those sections of the industry whose activities are not regularly reported from week to week in these columns.

It must indeed be evident, to any one who studies the results set forth, that the resumption of activity in the past few months has been felt by a wide variety of metal-working plants, both in the consumer product and the capital equipment fields.

The conclusion must be, therefore, that this is not merely a speculative buying movement, brought about by fear or hope of dollar depreciation.



Mechanics Tools

March, 17 per cent over February.
April, 8 per cent under March
May, 148 per cent over April.



GRATON & KNIGHT
Worcester, Mass.
Belting

April, 15.4 per cent over March.
May, 35.6 per cent over April.

Roosevelt Gives Us Both Plan and Means

THE month of April showed the beginning of the pick-up in our business, with a further increase in May which is continuing through June.

It is our honest belief that the far reaching program of public works, as well as the industrial control act and the other important measures sponsored by President Roosevelt, will result in a continuation of this improvement. These programs and laws not only define the plan of action, but provide a means whereby these plans may be executed.

Robert B. Morse, President,
Fairbanks, Morse & Co.,
Chicago.

...

"Old-Fashioned Boom" in 1935

WE expect the fall to be better than last year; 1934 much better—about 25-40 per cent better than 1933; and we expect and are planning on 1935 being a real old fashioned U. S. boom year. Believe it or not, that's what gives zest to these days!

H. L. Horning, President,
Waukesha Motor Co.,
Waukesha, Wis.

...

Building a Prosperous Era

THE key-men of our organization have had numerous meetings with a view to analyzing this subject and we have concluded that we have the foundation of building back to a prosperous era.

W. P. Andrus, President,
The High Speed Hammer Co., Inc.,
Rochester, N. Y.

...

Speculation Now Changing to Recuperation

IAM happy to tell you that there does appear to be considerable evidence from our experience that business has definitely turned the corner. This business falls in the broad category of industrial equipment, which, as



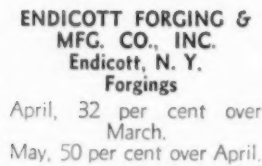
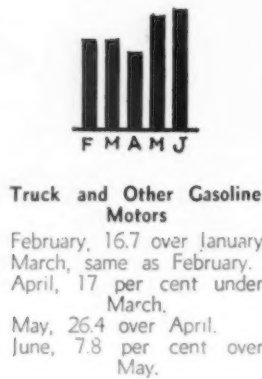
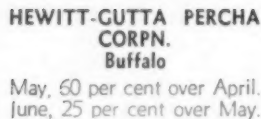
HAAG BROS., CO.
Peoria, Ill.
Washing Machines

April, 7 per cent over March.
May, 45 per cent over April.
June, 100 per cent over May.



HIGH SPEED HAMMER CO., INC.
Rochester, N. Y.
Riveting Machinery

February, 105 per cent over January.
March, 60 per cent over February.
April, 58.5 per cent over March.
May, 110 per cent over April.



you know, has been at an extremely low ebb during the last year or more.

As equipment purchases are necessarily spotty in character, any week-by-week or month-by-month comparison, for that matter—particularly starting from a low base, is likely to be unduly affected by one order, and for that reason I feel that a comparison of month to month, expressed in per cent, is misleading. It seems to me it should be sufficient for your purpose to say that our business so far this month is considerably in excess of the corresponding period of the last two or three months, as well as of the corresponding period of the same months a year ago. In addition to this there seems to be a very significant increase in the purchase of repair parts, which would be indicative of plants getting their houses in order as the result of increased volume.

There does not appear to me to be any question about an upturn having taken place, but there is some fear as to whether it is temporary or not and whether it is caused by a fear of inflation or as the result of the natural recuperative forces engendered by the prolonged depression. I suspect it was started by the former but believe it is being continued by the latter, and this is the basis for my personal belief that it will continue.

Howard Dingle, President,
Cleveland Worm & Gear Co.,
Cleveland.

Looks for Substantial Improvement

MAY business was a considerable improvement over any month during the past two years and was about 50 per cent over April. With the new Industrial Bill passing, which we hope will even things up, a substantial improvement should be looked for.

O. E. Landstrom, President,
New Home Sewing Machine Co.,
Rockford, Ill.

Jobs and Banks Must Be Reopened

COMPARING this year with last year, the first four months were woefully less than the same period in 1932. In actual percentage the first four months of 1933 were only 40 per cent of 1932, but the month of May turned the trick, and May, 1933, was merely 3 per cent more than 1932, and June so far looks as if it is going to be approximately 50 per cent more than June, 1932.

In the face of such performance, there is no question about it that based on our own actual experience, we believe that business in general has revived, that people have greater confidence, and without a question the next six months is going to be materially better than the last six months of last year. As I see it, to establish

anywhere near average good business in this country, the two things which are most essential are these:

1. People must have jobs. They must be back at work drawing some kind of weekly wages. Any amount of money spent for welfare work is worthless as compared to employment, regardless as to what that employment may be, as long as it will bring in a living wage.

2. It is absolutely necessary that our closed banks be either opened under some kind of a satisfactory arrangement or permanently closed, so that the depositors and the customers of these banks may either immediately be enabled to have normal banking service at their command at the bank with which they have been doing business, or they may start doing business with some other bank which is in position to give them normal service.

The Treasury Department should concern itself very vitally with this problem of opening the banks, so that the many millions of dollars that are now impounded may be again drawn into the channels of business.

A. S. Kurkjian, Sales Manager,
Oliver Machinery Co.,
Grand Rapids, Mich.

"Our Dealers Are Moving Goods"

WHILE recent buying has been largely for protection against rising prices, we know that our dealers are actually moving goods, indicating that planned operations that were delayed during the dark days we have recently been passing through are now actually going ahead.

William A. Speakman, President,
Speakman Co.,
Wilmington, Del.

Working Full Time

ALL departments of our shop are operating nearly on a full time basis and we are looking to the future with a great deal of confidence.

R. B. Baker,
Endicott Forging & Mfg. Co., Inc.,
Endicott, N. Y.

Refractories Parallel Steel Improvement

THE business of this company follows the ingot production of the United States so closely under any and all conditions that the improvement noted in the steel industry in the last two months coincides with the business improvement in our volume of sales and shipments. This has been true for over a period of years to my knowledge.

It is true that a considerable part of our business is used outside of the steel industry, but, nevertheless, our

WHITMAN & BARNES

Detroit

April, 2 per cent over March.
May, 66 per cent over April.



Scales, Computing Machines Etc.

April, 5 per cent under March.
May, 31 per cent over April.



Oils and Greases

April, 16 per cent over March.
May, 40 per cent over April.
June, 33 per cent over May.



Electrical Equipment

April, 1.4 per cent under March.
May, 38.4 per cent over April.



LINK BELT CO.

May, 20 per cent over April.
June shows increased improvement.

percentage of shipments against capacity is about the same as the ingot production against capacity.

We are not prepared to forecast, although we see nothing in the immediate future to turn this trend in a downward direction, and are hopeful that this fall will show a further improvement.

J. D. Ramsay, President,
North American Refractories Co.,
Cleveland

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ORDERS for valves and fittings received by the Walworth Co. for the first four months of the year were on a comparatively equal monthly basis and at a very low level. Commencing early in May, the volume increased substantially with the result that the May volume was the greatest since August, 1930. June is running practically at the May volume. In the meantime, prices have stabilized and the destructive competition has largely disappeared. To meet the increased demand, operations in our factories have been very substantially increased.

Howard Coonley, President,
Walworth Co.,
New York.

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Call for Prompt Shipments Is Encouraging

THERE has been a material and sustained improvement in business with us during the past two and a half months. It now is fairly certain that June will show more than double the volume of business booked in May and probably at least eight times the amount booked in June, 1932.

We do not like to make any predictions as to the future, but we feel that it is significant that practically all of the business being booked is for prompt or early shipment.

J. E. Lewis, President,
Harbison-Walker Refractories Co.,
Pittsburgh.

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A Spree Is Enjoyable, But the Headache!

IT would seem to me that as long as the Government continues to devalue the value of the dollar, there will be buying, and feverish buying, so as to get something for the dollar before it is further devaluated. Also, as long as the Government spends large sums of money on projects of questionable value, there will be more activity.

It is rather difficult to understand just how this system is going to work when the value of the dollar has to stop shrinking either by governmental action or by going down to zero. It also is rather difficult to understand what is going to happen when we can borrow no more

money to develop useless projects and then, with none of this to help us, have to pay the bill.

However, a spree is very enjoyable up to the time the headache begins.

J. F. Lincoln, President,
Lincoln Electric Co.,
Cleveland.

• • •

I AM very happy to inform you that there has been a most encouraging improvement in our business. This improvement started in the latter half of March and has continued without interruption. Orders booked for May were some three times larger than those booked in February, and June is surpassing May by a very good margin.

As to the outlook for the coming months, that, of course, depends upon the trend in the steel and other refractory consuming industries; however, it is only fair to say that the stocks in the hands of the consumers have been at extremely low levels and if the recent improvement in operations continues it should mean that substantial orders for refractories will have to be placed.

John R. Sproul, President,
General Refractories Co.,
Philadelphia.

• • •

Business Disturbed by Legislation

IN my opinion, business was well on the way to recovery, and, in fact, the recovery was taking place rapidly, but since the passage of the National Industrial Recovery Act such confusion has taken place in industry over the application of this piece of legislation that business has apparently stagnated and I fear the upward trend may cease. Of course, we know so little at this time as to the actual effect of this legislation we cannot well judge what the result is going to be, but we do know that business in general is very much concerned and very much worried over the possible outcome.

D. A. Currie, Vice-President and General Manager,
Erie Foundry Co.,
Erie, Pa.

• • •

Decided Upturn in Production

THERE has been a decided upturn in our production. This has no doubt been stimulated to some extent by the rapidly advancing prices of non-ferrous metals; but on the other hand, we find the demands of our customers are based largely on requirements. There is no doubt a general picking up all along the line in the non-ferrous foundry field which we supply.

G. H. Clamer, President and General Manager,
Ajax Metal Co.,
Philadelphia.



Mechanical Power Transmission

in varied form or method, is woven inextricably into both production and design in the metal-working industry. In fact, wherever wheels turn, power and machine efficiency depends on the correct drive.

Rapid changes in the art during the past two years and marked improvement in the means of transmission have made obsolete a large part of the past information on this subject and have opened many new opportunities for increased economies and efficiencies.

For this reason THE IRON AGE will present a series of power transmission articles by an outstanding authority—William Staniar, mechanical power engineer of E. I. du Pont de Nemours & Co. The articles will begin July 20 and continue once a month.

Mr. Staniar has been in charge of all mechanical power transmission applications for the past 15 years in the 73 du Pont plants comprising 125,000 transmission installations of various types.

In addition, he has had charge of laying out the transmission for the Cadillac Motor Car Co., and also installed his belting standardization system in Cadillac, Oakland, Brown-Lipe-Chapin and the Hyatt Roller Bearing companies of the General Motors Corp'n. His belting standardization system is also em-

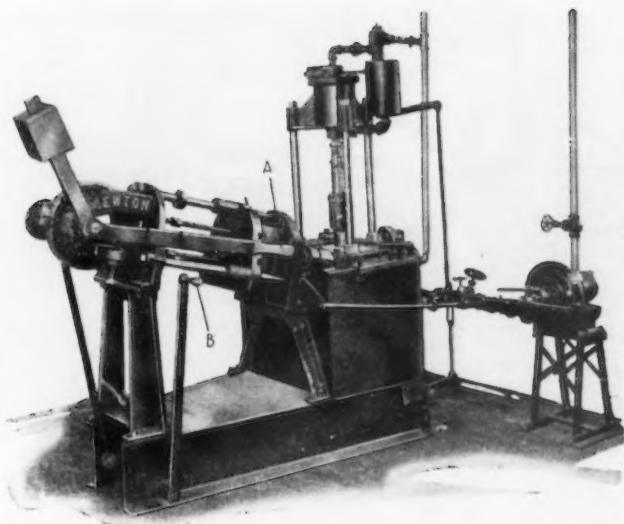
ployed in large units of the cotton and paper industries.

In the forthcoming series Mr. Staniar will illustrate and discuss *the selection of method of transmission* rather than the usual descriptions of types of apparatus. This material will deal not only with plant operation of transmission units, but also with design problems of interest to builders of machinery and other equipment in which transmission devices are incorporated.

This series will cover the principles and applications of both the flexible and the rigid systems of transmission. It will deal with group and direct drives, belting, V-rope drive, chain, pivoted motor methods, variable speed units, single and compound vertical and horizontal worm reductions, planetary and non-planetary spur reductions, herringbone reductions, motorized reduction units, open gear and the combination of the various transmission methods, as well as with couplings, bearings and other transmission devices.

It is with great pleasure that THE IRON AGE presents Mr. Staniar to its readers, as we know that his contributions to power transmission men will be the outstanding service of 1933 in this field.

John H. Van Dine
Editor, THE IRON AGE



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Semi-automatic die casting machine, one of three models recently introduced. Quick change - over from job to job, with dies changed in 20 min. or less, and savings in tooling cost are features emphasized.
▼ ▼ ▼

Unusual Economies Claimed for New Die-Casting Machines

SIMPLICITY of operation and quick change of set-up are outstanding features of three new die-casting machines being introduced by the Newton-New Haven Co., New Haven, Conn.

The operating simplicity eliminates the necessity for highly skilled operators, and the facilities for quick set-up or changeover from job to job make the machines economical for short runs of widely diversified castings, as well as for long, quantity production runs. Savings in tooling cost are also emphasized.

One of the machines is hand-operated, another semi-automatic and the third is full automatic. All of them employ the positive plunger injection principle.

There are but two operating levers on the hand and semi-automatic types, and only one on the full-automatic machine. Location of the controls on the semi-automatic unit may be seen in the illustration. Lever A is raised and lowered to open or shut the die; lever B is moved to the left to make a "shot," and is returned by a spring which at the same time operates the air valves to raise the injector plunger to self-loading position. Casting speed is said to be limited only to the speed of the operator and can run as high as 400 to 500 shots an hour on short runs and 600 to 700 shots an hour on continuous production runs. With the hand-operated machine, production rates are somewhat lower and with the full automatic the rates are considerably higher. Use of multiple-impression dies further increases the number of pieces per hour, in direct proportion to the number of impressions.

In building the machines modern practice, including use of welded steel, is followed. Major castings are of steel and all other stressed members

are made of heavy rolled-steel shapes or forgings. The furnace has a welded steel plate shell, which is lined with insulation and then with a non-shrinking, low-expansion monolithic refractory. It is heavily insulated against heat loss and fully protected against exterior damage.

Makes 1-In. Die Head for No. 2 B&S Screw Machine

THE Eastern Machine Screw Corp., New Haven, Conn., has brought out an H&G self-opening die head designed for No. 2 Brown & Sharpe automatic screw machines. The tool permits threading up to full 1-in. diameter, 2-in. long, in both coarse and fine pitches, and greatly enlarges the range of work that can be threaded with a self-opening die on these machines. Since high-speed

In the hand and semi-automatic die-casting machines the dies are quickly closed at high pressure by hand, but without exertion by the operator. In the full-automatic model, die closing is by means of an electric motor, clutch and safety trippers. The injector plunger of the semi-automatic machine is operated by a cylinder of special design which uses but one charge of air at 100 lb. pressure for both injection and plunger return—a feature stressed as permitting marked economy. Interlocks on all machines prevent casting shots from being made before the dies are locked closed.

Although all three machines will take dies up to 9 x 12 in. by 9½-in. deep, much smaller dies can be used, with a proportional saving in die costs. It is stated that since a complete change of dies, regardless of size, can be made in 20 min. or less, the machine may be used for a wide variety of castings, and that however used the fixed charges against one of these machines can be either divided between a large number of similar pieces or a large total of smaller numbers of dissimilar pieces.

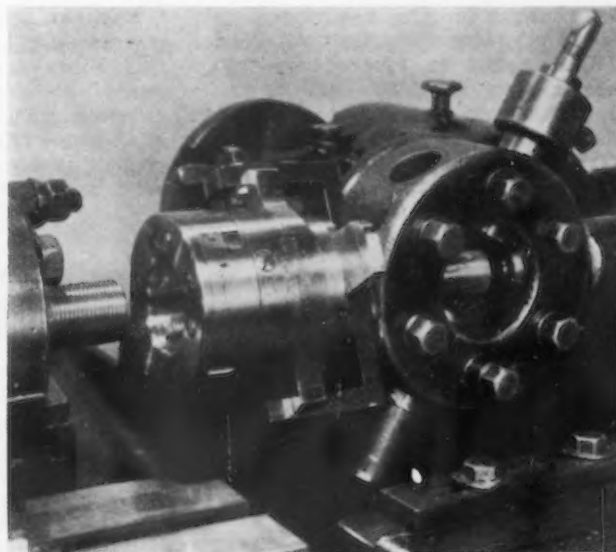
With the exception of the dies, each machine is shipped complete, ready to run. The equipment includes furnace, chassis, gas-firing equipment, pyrometer, die clamps, integral injectors and Zerk lubrication.

chasers are used, higher cutting speeds are possible. Chasers may be easily resharpened many times.

It is unnecessary to reverse the spindle for backing-off. This, it is stated, eliminates wear and tear on the machine from shock of reversal; saves time previously lost in backing-off the thread, and eliminates torn threads from backing-off. The usual reverse may be used as a second forward speed.

Notwithstanding the restricted outside dimensions, the tool takes the same chasers as 1-in. H&G die heads.

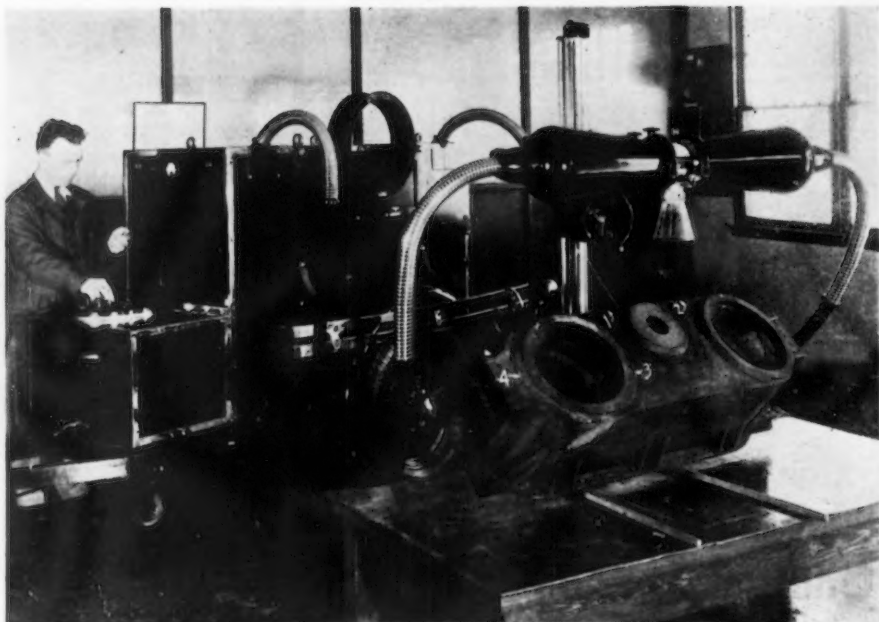
▲ ▲ ▲
This die head for No. 2 B & S automatic screw machines permits threading up to full 1 in. diameter, 2 in. long, in both coarse and fine pitches. High-speed chasers are employed.
▼ ▼ ▼



Portable X-Ray Apparatus Mounted On Trailer

THE Industrial X-Ray Corp., Chamber of Commerce Building, Los Angeles, has acquired the manufacturing and distributing rights to the Metalix portable industrial X-ray apparatus built and marketed in Europe by the N. V. Philips Corp., Eindhoven, Holland. The apparatus, being exhibited at the World's Fair in Chicago, is offered for inspecting raw material and work in process as well as finished work. Of the three sizes made, the largest, the Metalix 200, is here illustrated.

Mounted on a two-wheel trailer, the machine may be transported quickly to any location, and inside the shop it can be handled conveniently by an overhead crane. This unit, as well as the smaller ones, can be connected direct to a 220-volt outlet or to a 440-volt power main. It consists of a high-voltage generator contained in a metal cabinet; a control box, built against this cabinet, incorporating the necessary switches and regulating and measuring controls; and two shock-proof high-voltage cables which connect the transformer to the ray-proof and shock-proof Metalix tube.



Portable X-ray equipment applied to inspection of castings.

It is stated that with 180 kv. and 4 ma. the materials of the following thicknesses can be examined: Iron up to 3½ in. thick and up to 4 in. thick with special apparatus; copper, bronze and brass up to 2½ in. thick; and aluminum up to 10 in. thick.

Universal Bender Has Wide Range

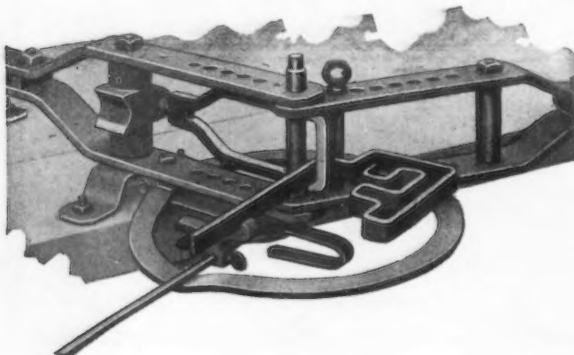
SIMPLICITY of mechanism and wide range of work are features of the universal iron bender offered by the Hossfeld Mfg. Co., Winona, Minn., for bending pipe, bars and angle iron. The machine, of wrenchless type, may be adjusted quickly for any kind of bend. It occupies a minimum of bench space and is light in weight, heat-treated alloy steels being used for parts subject to strain.

Two sizes are made. The larger has capacity for pipe and conduit up to 2 in. inside diameter, will bend 1¼-in. round or square bars into angles, irregular shapes, offsets, etc., and make sharp bends in 4½ x ¼-in. flat stock, cold. The machine will form eyebolts, make rings and coils and bend "U" and "S" shapes. It is

also adapted for making ornamental iron and other intricate bends. Attachments are available for bending angle iron with the flange either inward or outward, for bending notched angle iron, for forming automobile spring eyes and for making 90-deg. bends in conduit. A die has also been developed for bending thin-wall electrical tubing.

Electric Motor Has Small Diameter

AN electric motor of 100 hp. capacity, but less than 12 in. in diameter has been built by the Louis Allis Co., Milwaukee. The motor is regarded as ideal for direct-mounted grinding wheels, saws, cutterheads, etc., where the diameter and peripheral speed of the cutting tool must be held to a minimum.



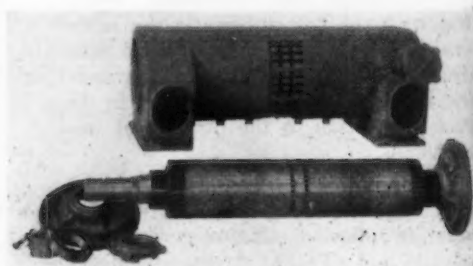
The bending machine at left may be adjusted quickly for and kind of bend.

Although of 100-hp. capacity, the motor at right is less than 12 in. in diameter.

Electric Eye Controls Belt Conveyor

AN interesting and novel photoelectric installation has been made at the plant of the National Enamel & Stamping Co., Granite City, Ill. A General Electric photoelectric relay controls a belt conveyor in the enameling plant. The relay is used at the end of the conveyor to prevent the ware from piling up at that point. A group of operators along the conveyor apply the beading to the ware and place it on a chain conveyor which takes it through the enameling furnace. Should the last operator miss a piece of ware, it interrupts the beam of light which in turn shuts off the conveyor motor. As soon as the operator picks up this piece of ware the conveyor automatically restarts.

An ingenious arrangement of the light source and photo tube was used to save space. The light source and photo tube are mounted underneath the conveyor. The beam from the light source is focused vertically. By means of a mirror this beam is reflected across the surface of the conveyor belt. A second mirror at the other edge reflects the beam downward to the photo tube. The beam is so arranged that a piece of ware only a quarter inch thick and several inches in dia. will stop the conveyor.





THE NEWS OF THIS WEEK

Automotive Companies Curtail Overtime to Aid Employment

DETROIT, July 5.—Conforming to the wishes of the Roosevelt administration as expressed in the Industrial Recovery Act, automobile companies and companies making automotive parts are not waiting for the industry to formulate a code before putting into effect shorter hours. One of the largest motor car makers is taking advantage of the long week-end holiday to install a straight eight-hour day in its plants. Because of the heavy demand for its cars recently, it has been operating overtime with its employees working from 9 to 12 hr. daily. It has decided to readjust its schedules so as to permit a maximum of eight hours by any worker and to employ extra help for the excess time. An important body builder likewise is cutting down its hours of work and augmenting its force as a consequence. Henry Ford is understood to be con-

sidering the restoration of his minimum wage to \$5 a day. It now stands at \$4. Members of the Michigan Manufacturers Association at a special meeting pledged their cooperation to President Roosevelt in carrying out his program for industrial recovery. John L. Lovett, general manager of the association, counseled against haste in effecting trade organizations or codes, remarking that "nothing final should be done until the interpretation of the act and regulations as to administration of it are promulgated by General Johnson." He added that there was nothing to fear in Section 7 of the Act providing for organization of employees and collective bargaining, since any unjust claims or attitude taken by employer or employees would be immediately vetoed by the Administration as destructive of the purpose of the Act.

German Machinery Regains Prewar Place

How Germany successfully rehabilitated its war-disorganized machine industry is revealed in a bulletin just issued by the Commerce Department. After many vicissitudes, the bulletin shows, the German industry at the beginning of 1933 had reached a position comparable to that of 1913.

Because of the strong position of Germany in export trade, the status of the German machinery industry is of especial significance to United States machinery manufacturers. During 1928-1932 Germany's average annual machinery exports, including reparations deliveries, amounted to \$291,800,000. In this same period Germany marketed in the United States \$41,000,000 worth of indus-

trial machinery, including textile machinery and a wide range of unclassified items.

Copies of the bulletin which is issued as Trade Promotion Series 146 are obtainable for 10 cents from the Superintendent of Documents, Washington, D. C., or from branch offices of the Bureau of Foreign and Domestic Commerce.

Reinforcing Institute Working on Code

Concrete Reinforcing Steel Institute, 333 North Michigan Boulevard, Chicago, is working upon the development of a proposed code under the current National Industrial Recovery Act.

Rules adopted at the trade practice conference cover such general items

as inducing breach of contract, misrepresentation, secret rebates, unfair discrimination, commercial bribery and a number of more detailed sections referring to the particulars of selling reinforcing steel.

The general code which is now being worked upon will follow and will be coordinated with the broad program for the steel industry now being developed by the American Iron and Steel Institute.

Subsidy Law Boosts Japan's Shipbuilding

Shipbuilding in Japan has increased materially under the influence of the ship construction subsidy law, and on May 1, 1933, it was stated that more tonnage was under construction than at any time in the past two years, according to a report to the Transportation Division of the Commerce Department.

Official figures for May 1 are unavailable, but on April 1 there were 33 vessels of 81,790 gross tons under construction. Total tonnage under construction on April 1, 1932, was reported at 64,570 gross tons.

Michigan Manufacturers Protest State Tax

DETROIT, July 5.—Members of the Michigan Manufacturers Association are protesting against the State's interpretation of its new 3 per cent retail sales tax, effective July 1, whereby the tax is to be imposed on merchandise sold by one manufacturer to another for use in the latter's products. This means that automotive parts sold by a Michigan manufacturer to an automobile maker within the State would be subject to the sales tax. It is estimated that if the State board of tax administration holds to its ruling and the courts sustain its action, Michigan manufacturers will lose at least \$40,000,000 in business annually.

to competitors with plants outside the State. Hal H. Smith, general counsel for the association, is hopeful that the courts will rule that manufacturers selling parts or raw materials to other manufacturers are not engaged in a retail business.

Answering questions put to him on Thursday at the meeting of the association in this city, Mr. Smith said that a drill press or any other tool made in Michigan and sold to a manufacturer in the State is taxable under the new law, according to its present interpretation. Likewise the drill press is taxable when sold outside the State by a Michigan manufacturer if the contract is made in Michigan. There was a difference of opinion as to whether the tax applied to pig iron and other raw materials.

Canadian Non-Ferrous Production in 1932

Manufactures from non-ferrous metals during 1932 were valued at \$161,957,930, or 24 per cent below the corresponding total for the previous year, according to preliminary figures compiled by the Dominion Bureau of Statistics at Ottawa. A total of 445 plants were in operation during the year and a monthly average of 29,059 persons were employed. Payments for salaries and wages totaled \$35,725,513 and expenditures for manufacturing materials amounted to \$69,408,670. Capital employed was reported at \$285,442,666.

Compared with 1928, aluminum products decreased in sales value

from \$3,192,696 to \$2,683,028. Brass and copper products shrank from \$28,457,430 in 1928 to \$11,932,472 in 1932. Lead, tin and zinc products, which in 1928 were \$5,493,360, were \$3,445,761 in 1932.

Larger Iron Content in 1932 Ore Movement

With the very light movement of Lake Superior ore last year, the average iron content of all grades increased to 52.16 per cent iron natural, as compared with 51.3 per cent in 1931, according to the annual report of the Lake Superior Iron Ore Association showing the average analyses. The iron content is the largest in the ten years covered by the report. Phosphorus increased to 0.099 per cent as compared with 0.087 per cent the previous year, silica increased to 9.05 per cent from 8.60 per cent, manganese declined to 0.68 per cent from 0.88 per cent and moisture declined to 9.92 per cent from 10.84 per cent.

Shipments of Bessemer ore increased to 35.4 per cent of the total as compared with 26 per cent the previous year, and low-phosphorus non-Bessemer declined to 50.3 per cent of the total from 63.4 per cent in 1931.

The iron content of Bessemer ore was 55.10 per cent and of low-phosphorus non-Bessemer, 51.24 per cent, both gaining over the previous year. The iron content of high-phosphorus non-Bessemer ore was 51.29 per cent and of manganese ore, 50.66 per cent, the latter increasing from 44.65 per cent in 1931.

Shipments by grades last year were: Bessemer, 1,257,925 tons; low-phosphorus non-Bessemer, 1,787,724 tons; high-phosphorus non-Bessemer, 298,086 tons; manganese ore, 102,703 tons, and silicious ore, 106,137 tons.

Rise in Steel Barrel Production

Output of steel barrels in May rose to 465,418 units, representing 33.9 per cent of the capacity of the 26 establishments reporting to the Bureau of the Census, from 401,086 or 29.2 per cent of capacity in April.

Production in the first five months of 1933 totaled 1,801,800 or 26.2 per cent of capacity, compared with 2,060,284 or 28.6 per cent of capacity in the corresponding period of last year. Unfilled orders for delivery within 30 days at the end of May totaled 127,115, an increase of 14,136 over unfilled orders for like delivery at the end of April. Unfilled orders for delivery beyond 30 days at the end of May totaled 487,099, a rise from 413,512 from the preceding month.

Last Minute Sales Leads

(Received too late for classification in our Plant Expansion Section)

Gulf Industries, Inc., Pensacola, Fla., care of Harvey W. Corbett, 130 West Forty-second Street, New York, architect, recently organized, plans new shipbuilding and repair plant on waterfront site secured from city. Company will take over an existing plant and erect addition, also adjoining works for manufacture of fabricated steel houses. Financing in amount of \$35,000,000 is being arranged under Government Public Works Bill for project. Mr. Corbett will be an official of company, which is headed by Lawrence R. Wilder, formerly president of New York Shipbuilding Corp., Camden, N. J.

Water Commission, Baraboo, Wis., F. M. Arndt, president, asks bids until July 12 for one hand-operated traveling crane with roller bearing geared trolley, 3-ton capacity, with I-beam runway, etc.; one vertical type water turbine, complete with draft tube, shafting, governor, etc., for water pumping station.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 14 for 100 rivet punches, steel wool, brass pipe, wire rods, pressure gages, etc. (Schedule 2882).

Berghoff Brewing Co., Fort Wayne, Ind., has plans drawn for addition to increase annual capacity to 500,000 bbl. Cost over \$200,000 with equipment. Richard Griesser, 64 West Randolph Street, Chicago, is architect.

Borough Council, Olyphant, Pa., has secured permission to arrange bond issue of \$100,000 for extensions and improvements in municipal electric light and power plant, including purchase of new equipment.

Procurement Division, Veterans' Administration, Washington, asks bids until July 10 for one motor-driven hack saw (Proposal 58-M), one pipe and nipple threading machine (Proposal 585-M), one wheel stretcher (Proposal 998).

Yoerg Brewing Co., 229 East Ohio Street, St. Paul, Minn., has plans for extensions and improvements, including new machinery. Cost about \$100,000 with equipment. Ellerbe & Co., Minnesota Building, are architects. Frank Yoerg, president.

Todd Shipyards Corp., 25 Broadway, New York, has plans for new ship repair and drydock in Houston ship channel, Houston, Tex., for which fund of \$1,100,000 has been approved by Reconstruction Finance Corp. Work will include three floating drydocks, two with lifting capacity of 10,000 tons, and one of 5500 tons, three piers, group of one-story shop units for metal-working and other construction and repair departments. It is understood that a subsidiary is being organized to carry out project. John D. Reilly is president.

India Wharf Brewery, Brooklyn, care of Shampian & Shampian, 188 Montague Street, architects, has plans for new multi-story brew-house, bottling plant, refrigerating plant and other units at Hanover Avenue and Conover Street. Cost over \$400,000 with equipment.

Village Council, Amherst, Ohio, has secured permission to erect a municipal electric light and power plant. Cost about \$100,000 with equipment. F. N. Straus, 2613 Queenstown Road, Cleveland, is engineer.

Pelican Brewing Co., 200 Alva Building, New Orleans, C. S. Foster, secretary-treasurer, recently organized, has plans for four-story brew-house, 50 x 50 ft.; three-story storage vat and tank unit, with mechanical washing, racking and other departments; two-story bottling plant, 40 x 100 ft.; one-story power house, 30 x 50 ft., and office. Cost \$250,000 with equipment. Samuel Stone, Jr. & Co., Inc., Masonic Temple Building, is architect.

Old Monroe Brewing Association, E. H. Gundlach, president, 601 National Bank of Commerce Building, St. Louis, has been incorporated for \$40,000 to take over Monroe Brewery, Columbia, Ill. Plans are under way for a 12-story brewery, about 400 x 600 ft., to cost \$1,500,000.

Carondelet Brewing Co., F. N. Hoelzer, president, 2025 Gravois Avenue, St. Louis, has been incorporated to remodel Laclede Packing Co. plant into a brewery. Plans are under way for installation of equipment for daily capacity of 250 bbl.

Central Brewery, East St. Louis, Ill., has been purchased for \$500,000 from Independent Breweries Co. by a syndicate headed by H. L. Rupert, St. Louis, which will spend about \$200,000 for rehabilitating plant.

North Loup Hydro-Electric & Irrigation Project, Lincoln, Neb., recently organized, care of Balck & Veatch, Mutual Building, Kansas City, Mo., consulting engineers, is arranging fund of \$2,905,000 for hydro-electric generating plant on Loup River, near Ord, Neb., including power dam, transmission lines, switching stations, etc., in conjunction with new irrigation system.

Great Lakes Brewing Co., Indiana Avenue, Grand Rapids, Mich., has plans for extensions and improvements, including addition for mechanical bottling unit. Cost about \$125,000 with equipment. Donald Lakie, Grand Rapids, is architect.

City Council, Radford, Va., has authorized plans for new municipal hydroelectric power plant on Little River, including transmission and distributing lines. Fund of \$150,000 recently was voted. Wiley & Wilson, American National Bank Building, Lynchburg, Va., are consulting engineers.

Code Committee of Scrap Steel Institute Recommends 35c. an Hour Wage Minimum

CHICAGO, July 5.—A minimum wage of 35c. an hour for all labor employed in the scrap iron industry, with 40 hr. per week as the maximum working time for each laborer, was the recommendation adopted July 3 by the code committee of the Institute of Scrap Iron and Steel. This proposal will be submitted to the annual convention of the institute, which takes place today and Thursday at the Sherman Hotel in this city.

Recognizing that a differential must be established for labor in the South, the amount of the differential was left to be determined by the annual convention.

Benjamin Schwartz, director-general of the institute, estimated that this decision, if approved by the Government, will increase employment in the industry by at least 25 per cent.

The committee also recommended that the National Recovery Administration be asked to help eliminate reciprocal agreements involving scrap between steel mills and producers of scrap.

The code committee voted to incorporate into the new code all the rules governing business practices approved by the Federal Trade Commission in 1929 for the scrap iron industry. This move will reinforce the old code with the additional powers and penalties provided for in the Industrial Recovery Act. It was decided by the committee that any discussion or action on the question of price stabilization or on any rule condemning the sale of scrap below cost shall be deferred, pending action that may be taken by the American Iron and Steel Institute.

Secondary Metals Industries to Codify

A meeting of representatives of the non-ferrous secondary metals industries was held at New York on June 29. It was decided that two representatives each from the Non-Ferrous Ingot Metal Institute, Aluminum Research Institute and metals division of the National Association of Waste Material Dealers will promptly meet with two representatives each from the white metal manufacturers and such other kindred metal industries as may be found desirable, for the purpose of formulating a labor code, to include provisions as to maximum hours, minimum wage rates, etc., for submission to the Industrial Recovery Board.

Ivan Reitler, president, Federated Metals Corp., New York, who served as chairman of the initial meeting,

was chosen to act in the capacity of chairman of the joint committee. The personnel of the joint committee is, at present, as follows: Ivan Reitler, chairman; George Bangs, New York; George Birkenstein, Chicago; L. Chapman, Chicago; Henry Levitt, Detroit; T. Lewin, East St. Louis; Louis Lippa, Chicago; E. E. Oury, Nashville, Tenn.; F. Schmutzer, New York; P. E. Sprague, Hammond, Ind.; Walter M. Weil, Cleveland; C. B. White, Philadelphia.

Bi-Weekly Service on Lakes-Gulf Barge Line

The Federal Barge Line has inaugurated a twice weekly service on the Lakes-to-Gulf waterway. Three hundred new barges are now afloat along the new trade route between Chicago and New Orleans. Among the first barges to leave Chicago were several loaded with steel at Gary, Ind.

Baltimore Tunnel of P. R. R. to be Completed

BALTIMORE, July 4.—Preparations have been made by the Pennsylvania Railroad to complete its new tunnel through Baltimore. To this end it has announced that it has sent orders to the Arundel Corp., of this city to proceed with the work. The tunnel work is part of the program of the Pennsylvania in completing its electrification between Wilmington, Del., and Washington. This work was suspended early in 1932. Men have been put to work erecting poles for electrification between Wilmington and Washington. Steel for the electrification project was rolled long ago and most of it lies along the right of way.

Porcelain Enamel Institute Elects

Rudolf W. Staud, Benjamin Electric Mfg. Co., Chicago, was re-elected president of the Porcelain Enamel Institute, national trade association of the enameling industry, at its third annual meeting in Chicago, June 28. The other officers elected are: Earle S. Smith, Toledo Porcelain Enamel Products Co., and F. E. Hodek, Jr., General Porcelain Enameling & Mfg. Co., vice-presidents. William Hogen-son, Chicago Vitreous Enamel Product Co., was reelected treasurer for

a third term, and George P. MacKnight was reelected secretary.

Members of the Institute's executive committee will include the officers and Bennett Chapple, American Rolling Mill Co.; Louis Ingram, Ingram-Richardson Mfg. Co.; E. H. Weil, Vitreous Steel Products Co.; George S. Blome, Baltimore Enamel & Novelty Co.; W. R. Greer, Porcelain Enamel & Mfg. Co.; R. A. Weaver, Ferro Enamel Corp., and A. J. Kieckhefer, National Enameling & Stamping Co.

More than 100 leaders of the industry from all sections of the country were present.

A feature of the meeting was the adoption of a resolution calling for the sponsorship by the Institute of a National Recovery Coordinating Committee for the porcelain enamel, metal stamping and allied industries. This committee is to determine what steps shall be taken by all users of porcelain enamel under the National Industrial Recovery Act.

Ingersoll and Ludlum To Make Krupp Barrel

Ingersoll Steel & Disc Co., Chicago, a division of Borg-Warner Corp., and the Ludlum Steel Co., have arranged with Krupp of Germany to manufacture and sell metal beer barrels in the United States under the Krupp patent. The new barrel will be made of ply-steel, thereby affording a stainless steel lining, and it will be insulated against heat and cold. This barrel is especially reinforced to protect it against damage in handling.

Navy Program Calls for 37 Vessels

WASHINGTON, July 5.—The Navy's program for the 32 vessels to be built under the National Recovery Act calls for construction of 16 each in private and Navy yards. Bids from private yards will be opened July 26. On that date, also, figures will be received from private yards on a heavy cruiser and on four destroyers under an authorization outside of the National Recovery Act. The Navy will allot to its own yards 16 vessels as follows: three light cruisers, nine destroyers, two gun boats and two submarines.

J. I. Case Co., manufacturer of farm equipment, Racine, Wis., has leased the Wisconsin Grey Iron Foundry Co.'s plant at Milwaukee and has recalled 50 employees.

OBITUARY

WILLIAM STUEBING, veteran in the machine tool industry in Cincinnati, died on June 27 as the result of injuries received in an automobile accident. Mr. Stuebing was vice-president of the Stuebing Automatic Machine Co. Before entering the machine industry, Mr. Stuebing was employed in the pressrooms of a local newspaper. He was 83 years old.

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DAVID SLOAN, former chief engineer, Illinois Central Railroad, died June 24, aged 85 years. He was born in Ireland and entered railroad service at Chicago in 1871. After leaving active railroad work he practised consulting engineering for a number of years.

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CHARLES MALISCHKE, president, Malischke Tool & Die Co., Milwaukee, died June 21, aged 60 years. He was born in Germany and established his business in Milwaukee in 1905.

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ROLAND ERWIN WIENS, sales representative at Cambridge, Mass., of the Allis-Chalmers Mfg. Co., Milwaukee, died in a hospital at Milwaukee on June 24, after an illness of two months. He was born in Milwaukee in 1897 and was graduated from the United States Naval Academy in 1917, serving through the World War as an ensign. He became associated with the Allis-Chalmers company in 1922.

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WALTER H. PENFIELD, vice-president and comptroller of the Colt's Patent Fire Arms Mfg. Co., died on June 27, at the New Haven, Conn., hospital. He was born in Portland, Conn., on Feb. 4, 1873, and became permanently associated with the fire arms company in December, 1901.

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ARTHUR J. MASON, engineer and inventor, died June 28 at his home at Flossmoor, Ill. He was 76 years old. Mr. Mason was born at Melbourne, Australia, and came to America in 1881. He invented a machine for unloading iron ore and also machinery for cutting coal in mines.

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EMORY O. PENRY, vice-president the Auburn Automobile Co., Auburn, Ind., and a director of the Cord Corp., died July 2, aged 49 years. Mr. Penry started his career with the Auburn company 22 years ago as a tester. He became superintendent and later was made general manager of production of Auburn and its affiliated companies.

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DAVID J. POST, one of the founders of the Veeder Mfg. Co., Hartford, Conn., now Veeder-Root, Inc., of which

he was a director, died at his home in West Hartford after a short illness on June 24. He was also a director of the Holo-Krome Screw Co., Bristol, Conn., and chairman of the board of the Billings & Spencer Co., Hartford. He was 72 years old.

Fabricated Plate Orders Higher in May

Orders for fabricated steel plate in May rose to 16,243 tons from 9502 tons in April, according to reports received by the Bureau of the Census from 48 concerns. Requirements for oil storage tanks in May totaled 2858 tons while gas holder tonnage was 4157. Orders for fabricated steel plate in the first five months of the current year totaled 62,364 tons compared with 73,788 tons in the corresponding period of last year.

Wood Becomes V. P. of Illuminating Society

L. A. S. Wood, manager lighting products division of the Westinghouse Electric & Manufacturing Co., whose headquarters are in Cleveland, has been elected vice-president of the Illuminating Engineering Society. Mr. Wood will assume his office in the society October 1, 1933.

Mr. Wood, an international authority on lighting, is the grandson of one of the associates of Michael Faraday, British physicist, who invented the dynamo and discovered the principle of electromagnetic induction.

Output of 218,181 Motor Vehicles in May

WASHINGTON, July 4.—The production of motor vehicles in the United States in May rose to 218,181 compared with 180,667 in April, according to reports received by the Bureau of the Census from manufacturers. The May output consisted of 184,578 passenger cars, 33,539 trucks and 54 taxicabs. In the first five months of 1933 the output totaled 753,656 against 688,242 in the corresponding period of last year.

Canadian production in May was 9396 compared with 8255 in April.

Ex-Cell-O Corp. Increases Wages

The Ex-Cell-O Aircraft & Tool Corp., Detroit, has increased wages of its employees 5 to 10 per cent. Its volume of business in May showed a gain of 46 per cent over that of April, and June sales were 54 per cent ahead of those in May.

TRADE NOTES

Hart & Cooley—Tuttle & Bailey Co. Tuttle & Bailey of Brooklyn, N. Y., manufacturers of cast metal registers and ornamental grilles, and Hart & Cooley of New Britain, Conn., makers of wrought steel registers and grilles, have consolidated their manufacturing operations and sales forces. Economy of sales and manufacturing operations through centralized management will enable the combined companies to offer a complete line of both cast and perforated metal grilles, warm air registers, air conditioning and ventilating registers.

The contract business, including the manufacture and sale of ornamental grilles and ventilating registers, both cast and perforated, will be handled by Tuttle & Bailey, Inc. The executive offices, including the engineering and accounting divisions, will be located in New Britain, Conn. For the convenience of the trade, main sales offices will be continued at 70 Berry Street, Brooklyn, N. Y., and at New Britain, Conn. Branch offices will be maintained in Boston, Philadelphia, Chicago and Kansas City in addition to local representatives in other principal cities. To the company's plant at New Britain, Conn., already completely equipped for the manufacture of wrought products, have been added modern bronze and iron foundries. Henceforth all manufacturing for the trade in the United States will be done at the New Britain plant. Manufacturing for Canadian trade will be continued by Tuttle & Bailey Mfg. Co., Ltd., at the Fort Erie North, Ontario, plant.

The stock register business, comprising the manufacture of warm air registers and furnace accessories, will be located in the plants of the Hart & Cooley Manufacturing Co. at New Britain, Conn., and Holland, Mich., and Tuttle & Bailey Mfg. Co., Ltd., Fort Erie North, Ontario, Canada.

Clark Controller Co., Cleveland, manufacturer of electrical and mechanical apparatus, has appointed W. S. Gain, 416 Lafayette Building, Buffalo, representative in the Buffalo district for its products, effective July 1.

Bryant Machinery & Engineering Co., Chicago, has appointed James R. Murphy exclusive representative in Milwaukee territory, with headquarters at 610 West Wisconsin Street, Milwaukee.

American MonoRail Co., 13107 Athens Avenue, Cleveland, has appointed the following distributors of its material handling equipment: T. Spencer Williamson, Mutual Building, Richmond, Va., in Virginia; McVoy-Hausman Co., Birmingham, in Alabama; D. S. Mair Machinery Corp., 505 Esperson Building, Houston, in Texas, and United Machinery Co., 289 East Salmon Street, Portland, Ore., in the Oregon territory.

Lunkenheimer Co. has moved its Boston branch to 291-293 Congress Street.

Millar-Jackman, Inc., Pittsburgh, has been organized to succeed and expand business conducted for past 10 years by Industrial Products Corp., Pittsburgh. New company will act as a manufacturers' agent and jobber of industrial supplies, specializing in reconditioning worn-out tools. Directors are W. E. Millar, David E. Jackman, Jr., W. W. Millar, Norman B. Ward, and W. G. A. Millar.

McVoy-Hausman Co., sales agent, Brown-Marx Building, Birmingham, has been formed as a partnership of agencies formerly known as James L. McVoy and Hausman-Harwick Machine Tool Co. Companies which it will represent in Birmingham district include Cleveland Worm & Gear Co., Farval Corp. and Foundry Equipment Co., all of Cleveland.

PERSONALS

GEORGE C. ISBESTER, who has been in continuous contact with the railroad supply and equipment industry since 1899, has become associated with the Yale & Towne Mfg. Co., Philadelphia division, to direct sales of hand and electric trucks and tractors to railroads in the Mid-western territory, with offices at 713 Railway Exchange Building, Chicago. He has for several years been identified with the development of materials handling methods and equipment for railroad terminals, stores, shops and freight houses. He entered the railroad field in the mechanical department of the Great Northern in 1899.



G. C. ISBESTER

T. F. THORNTON, for the past six years in charge of tubular products sales in the Detroit district for the Pittsburgh Steel Co., has been appointed sales manager of that district with headquarters in the Ford Building, Detroit, by the Babcock & Wilcox Tube Co., Beaver Falls, Pa.

W. J. HARRIS has been elected a vice-president of the American Car & Foundry Co., New York. He will continue in charge of the purchase section, which he has headed since his transfer to New York from Berwick, Pa., in April, 1920. In 1889 he became identified with the Jackson & Woodin Mfg. Co., one of the companies which went into the formation of the Foundry company.

GEORGE V. CHRISTIE, general sales and advertising manager of Gifford-Wood Co., Hudson, N. Y., has resigned. He has likewise resigned as vice-president and general manager of the Gifford-Wood subsidiary, Van Blerck Marine Motors, Inc. His plans have not been announced.

H. R. ORWICK, for 16 years general manager of Corundite Refractories, Inc., Massillon, Ohio, has become special refractory engineer for the Massillon Refractories Co., of the same city.

H. L. EDINGER, of the Barnett Foundry & Machine Co., Irvington, N. J., has been elected president of the New Jersey Foundrymen's Association. Other officers elected for the ensuing year are: Vice-president, P. R. VAN DUYN, Meeker Foundry Co.; treasurer, J. A. WILLIAMSON, Isbell-Porter Co., Newark, and secretary, G. W. HANNAY, Barnett Foundry & Machine Co.

H. C. THOMAS, who has been assistant to the general works manager of the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been ap-

pointed sales manager for the company's micarta products, a newly created position. In his new capacity, he will direct the sales of micarta products, produced at the company's Trafford City, Pa., plant. Developed as an insulating material, micarta has been applied in many other fields, most recently in the building and furniture industries as a subject for art processes. Mr. Thomas is a graduate of Purdue University and has been identified with the Westinghouse organization since 1910.

F. A. HAUSMAN, former head of the Hausman-Harwick Machine Tool Co., Birmingham, Ala., has joined JAMES L. McVOY as a partner in a new sales agency to be known as the McVoy-Hausman Co. The new company will represent among other manufacturers the Bliss & Laughlin, Inc., Harvey, Ill., manufacturers of cold-finished steel bars.

THOMAS R. DICKINSON has been appointed purchasing agent of the Bessemer & Lake Erie Railroad Co. and of the Union Railroad Co., Pittsburgh.

RAY A. LACKNER, 801 Oliver Building, Pittsburgh, has been appointed district sales manager in western Pennsylvania and West Virginia for Hammermill Products, Inc., Erie, Pa., a subsidiary of the Hammermill Paper Co., and will handle exclusively the company's Permex floor covering, a new product designed for industrial floors which are subjected to hard usage.

JESSEL S. WHYTE, secretary, Macwhyte Co., Kenosha, Wis., manufacturer of wire rope and cable, has been appointed to succeed himself as a

member of the Wisconsin State Board of Vocational Education for a six-year term expiring July 1, 1939.

ARTHUR W. THOMPSON, since 1927 assistant sales manager of the Red Top Steel Post Co., Chicago, has been appointed sales manager, succeeding LUTHER H. ATKINSON.

EDGAR STILLEY has been made direct factory representative in Maryland, North Carolina and Virginia for the Chain Belt Co., Milwaukee. He will make his headquarters at 210 Snow Building, Baltimore.

H. G. HOGLUND, who has represented the General Electric Co. in New England, has been appointed sales manager of the machine tool division of the Van Norman Machine Tool Co., Springfield, Mass. He is a graduate of the school of engineering of Purdue University.

JOHN C. SHOVER, personnel department, Antioch College, Yellow Springs, Ohio, was elected president of the Society of Industrial Engineers at its national convention held June 27 to 30 at Chicago. FREDERICK R. SHANLEY, of J. L. Jacobs & Co., Chicago, consulting engineers, was elected treasurer and GEORGE C. BENT, Chicago, was reelected executive secretary.

RAY S. FOX, who has been in charge of pig iron sales for the Cleveland Cliffs Iron Co., Cleveland, for the past 15 years, has resigned. That company handles the merchant iron product of the Otis Steel Co. Mr. Fox previously was associated with pig iron sales organizations in Cincinnati, Chicago and St. Louis.

Electric Hoist Makers Name Code Committee

Electric Hoist Manufacturers Association, at its meeting held in New York, on June 27, appointed a committee consisting of F. A. Hatch, president of Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.; F. F. Seaman, general manager, hoist and crane division of Robbins & Myers Sales, Inc., Springfield, Ohio, and J. G. Worker, general sales manager of American Engineering Co., Philadelphia, to draft a code of practice for the electric hoist manufacturing industry.

This code will be presented to the membership of the association for adoption at an early meeting, after which it will be submitted to the administration at Washington for the President's approval.



▲ ▲ ▲ THIS WEEK IN WASHINGTON ▲ ▲ ▲

Textile Code Ready for President

But Work Week and Wage Provisions Will Not Be Typical for Other Industries

WASHINGTON, July 5.—Submitted by the cotton textile industry for approval by President Roosevelt, the initial basic code of fair competition is being eagerly studied by industry.

While Administrator General Hugh S. Johnson has emphasized the fact that the Administration does not propose that the first code set up shall be a precedent for codes of other industries, there are nevertheless some principles in it and its regulations which are expected to prove a guide for codes generally. This is especially true of suggested means for long range planning, cost accounting, control of "machine loads," and keeping checks through reports from open price associations of prices in order both to eliminate the "chiseler" and the excessive prices and to record production, sales and stocks. Some of these proposals were detailed in a series of regulations, supplementary to the code, including the licensing of new productive machinery, except replacements.

The Cotton Textile code itself still awaits approval, both the work-week and the wage proposals remaining as points of contention. The wage rates proposed represent concessions of \$2 by textile manufacturers but they stuck to the original 40-hr. week, which compares with the present range of 48 to 55 hr. Organized labor was only partially successful in getting a higher wage scale, which, like the supplementary regulations, was agreed upon by the manufacturers last Friday and brought to an end the four-day hearings held in the auditorium of the Department of

By L. W. MOFFETT

Resident Washington Editor, The Iron Age

Commerce. Industrial and labor groups from all over the country crowded the auditorium and manifested extremely keen interest in the proceedings which marked the fore-runner to the "government-business" partnership, proposed to become officially effective on July 17.

The steel and most other industries probably will be given shorter work weeks than that given the cotton textile industry. The cotton textile industry is considered an exception in this direction and therefore clearly its scale on that score cannot be construed as a precedent.

Textiles' 40-Hour Week Not a Precedent

THIS point was made clear by General Johnson, in speaking of the textile code:

"A 40-hr. week in industry, generally, would not scratch the surface of our job of putting large numbers of unemployed back to work," he declared. "Indeed, I know of no other industry in which we could even receive for consideration a code proposing a 40-hr. week."

Organized labor as a group is contending, though no doubt not expecting full compliance of its request, for a 6-hr. day, five-day week, or a 30-hr. week. President William Green asked for this schedule at the cotton textile

code hearings. Other representatives of labor suggested either an identical schedule or one similar and asked for higher wages than the code proposes. President Green asked that they be set at \$14 per week for the South and \$16 per week for the North, thus at least going along with the majority of the cotton textile industry in agreeing that there should be regional differentials.

The hearings were entirely free of disputes between labor and the industrialists. This was due partially to the clearly cooperative spirit both showed toward getting the new law into effect, setting up a sweeping change in the country's economic system and attempting to quickly restore employment and purchasing power as a means of bringing the country's business back to normal.

The smoothness of the procedure also was due in an important degree to the firmness, yet fairness with which Deputy Administrator presided. No arguments were permitted and his position, in complete accordance with the law itself, was strongly upheld by General Johnson who sat throughout the hearings and took a prominent part in questioning witnesses, a function which only he and Deputy Administrator Allen had exclusively. It is purely an administrative procedure. Sitting with them were the Industrial Advisory, Labor Advisory, and Consumers' Advisory Boards.

Company Unions Not Mentioned

THE length of the work week and amount of wages constituted the highlights of the labor situation. Collective bargaining, company unions,

etc., which no doubt will mark hearings on forthcoming codes, were not mentioned. On the length of the work week in the different industries, the normal employment and the existing departure from that level will be primary factors. The peculiar conditions prevailing in each industry obviously will be taken into account. These will be an influential element in determining length of shifts as well as of the work week in continuous process industries such as steel. The work week in the cotton textile industry is relatively high because the industry now is operating at a high rate and if curtailed much more, it was predicted by manufacturers in the industry, a shortage of labor would develop. It is expected the 40-hr. scale will return to work some 60,000 workers above the level engaged in October, 1930. Child labor having been banned—children under 16—the tendency toward a shortage necessarily was strengthened.

The Cotton Textile code was presented by George A. Sloan, president of the Cotton Textile Institute, recognized as the "truly representative" trade association of the industry. It was hoped to have the code in effect by July 17, but one of the last-minute amendments including the "white-collared" office worker in the wage increase and 40-hr. week scale, will postpone adoption until July 30.

Once the code is approved, it is expected that codes in large volume will begin to pour into the administration, both basic and "supplementary." Basic codes now being awaited in particular are those covering the steel, coal, oil, and automobile industries. Some of these are expected even before approval of the Cotton Textile code and hearings may be started on such codes in the immediate future. There has undoubtedly been a reluctance on the part of some industries to submit codes, but action on the Cotton Textile code, it is hoped, will stimulate action. General Johnson has repeatedly said the act will be either a success or failure within two months, and he is therefore urging quick submission of the basic codes, leaving for later attention "supplementary codes," a number of which have already been presented.

General Johnson expressed gratification when he accepted the code at the end of the hearings for presentation to President Roosevelt. He lauded the cooperative spirit of both the textile manufacturers and labor. President Robert Amory of the National Association of Cotton Manufacturers, a member of the code committee, declared that the code marks the beginning of a new deal in the cotton textile industry, with fatter pay envelopes and the probability of steady work. He said that "There will be a tremendous increase in the cost of goods. Wages in low-pay, long-hour mills will be almost doubled. In much of the country's production, he added,



J. V. W. REYNDERS

the labor cost will be double that of 1926.

The long-range planning proposal of the Cotton Textile industry, offered outside of the code, has created much interest. Contrary to published reports, manufacturers say it distinctly does not provide for price-fixing or monopolistic tendencies.

Uniform Cost Accounting

UNIFORM cost accounting, cooperative services for small mills, control and checking of wild expansion booms, flexibility for control and prevention of seasonal shortages of certain kinds of goods, elimination of discrimination between customers, and elimination of the "chiseler" and "racketeer," and control of machine production are fundamental parts of the plan.

This is consistent with repeated statements of members of the National Recovery Administration that codes themselves are flexible, subject to changes that will develop improvement in their operation. The additional machinery set up by the cotton textile industry is designed to deal with problems as they arise, without the necessity of framing a new code. The suggested machinery also remains to be approved.

It proposes a committee to be selected by trade associations of the cotton textile industry to cooperate with the Administration as a planning and fair practice agency.

It would make recommendations as to requirements of the Administration for statistical information and keeping uniform accounts so as to properly observe the code and promote a balance between production and consumption and stabilization of the industry and employment.

It would recommend a service bureau for engineering, accounting, credit and other purposes to aid the

small mills in meeting the conditions of the emergency and the requirements of the code.

It would make recommendations looking to requirement by the Administration of registrations by manufacturers of their existing productive machinery, for requirement of a certificate by the administrator prior to the installation of additional productive machinery, except for replacement, of a similar number of existing looms or spindles or to bring the operation of existing productive machinery into balance. These could be granted or withheld by the administrator.

It would make recommendations for changes in, or exemption from, provisions of the code as to working hours of machinery which will tend to preserve a balance of productive capacity with consumption.

It would make recommendations of requirements by the administrator as to practices, methods and conditions of trading, reporting of prices to avoid discrimination so as to promote stabilization of the industry and to prevent and eliminate unfair and destructive competitive prices and practices.

It would make recommendations to regulate disposal of distress merchandise in a way to secure the protection of the owners and to promise sound and stable conditions in the industry.

It would recommend supplying of information to furnishing credit to the industry.

It would recommend advising the Administrator as to importation of competitive articles in substantial quantities to the extent of rendering ineffective or endangering the maintenance of the code.

Limitation of Machine Load Proposed at Hearings

THE limitation on the "machine" load was frequently proposed at the hearings. One aim is to do away with the "stretch-out system" and to engage more workers. Increase in the machine load of the employees is known as the "stretch-out" system.

While certificates would be required for installation of additional productive machinery, it is the belief in some quarters that the plan really will encourage junking of obsolete equipment and purchase of new machines in order to reduce costs. Certificates would not be required, however, for the purchase of machinery intended to replace existing capacity.

There was much attention given to the matter of productive capacity at the hearings. General Johnson's position is that productive capacity should not be built up during the emergency and to that end has suggested no increase in output of labor-saving devices. It is his idea that this is

necessary during the emergency only in order to increase employment.

Manufacturers opposing limitation of machinery said it is not an economical practice because it increases the cost to the consuming public. President Green of the American Federation of Labor said, in his testimony urging the shorter day and work week with higher wages, he did not have in mind any limitations upon the operation of mills and plants. He declared that he is sure it is not the purpose of the Industry Recovery Act to impose limitations upon production. John L. Frey, also a member of the American Federation of Labor, said he was unwilling to commit himself to the statement that any condition justifies discontinuing machinery, limiting the amount of power or "going back to obsolete methods in order to carry on production." He pointed out that as improved methods of production are introduced in industry, industry must match the situation by continual reduction in the hours of labor. The organized labor position briefly is reflected in the latter statement.

Survival of the Fittest

General Johnson declared that the tendency of unlimited use of machinery is to eliminate the inefficient plants throughout the country and leave production to the more efficient. If the more efficient plants turn out more units of production, he said, less man hours are required and this in turn reduces employment. To manufacturers protesting against limiting the use of labor-saving machinery, General Johnson readily conceded that it is a sound practice in the long run. But, General Johnson said, in a crisis like the present, the purpose is to put more men back to work.

The National Recovery Administration continues to add to its staff. Malcolm Muir, president of the McGraw-Hill Publications, New York, was selected by General Johnson as deputy administrator. It is reported that Mr. Muir will include in his work the study of machinery codes and problems coming before the Administration. For additional members of the Consumers' Advisory Board, General Johnson selected Professor Alonzo E. Taylor of Stanford University, and Lucius Eastman, president of the Hills Brothers Co., New York.

It is reported that J. V. W. Reynders, well known in the steel industry, also is to be appointed as a deputy administrator and may be assigned to passing on steel codes and problems of the steel industry as related to the National Recovery Administration.

I. Levinstein & Sons, formerly brokers in scrap iron and steel at East Moline, Ill., have moved to Chicago and have opened offices at 122 South Michigan Avenue, where they will continue in the brokerage of scrap iron and steel.

Boards Estimate Next Quarter's Steel Loadings

WASHINGTON, July 5. — Reflecting an increase of 47.1 per cent, or 59,108 cars, estimated loadings of iron and steel in the third quarter fixed by the 13 Shippers' Regional Advisory Boards are 184,471 cars, compared with 125,363 cars in the corresponding period of last year. The largest increase estimated by the Shippers' Board, announced through the American Railway Association, is in ore and concentrates. Loadings of ore are estimated at 169,015 cars, an increase of 92.5 per cent over similar loadings in the third quarter of 1932. Machinery and boiler loadings are estimated at 16,536 cars, a gain of 22.9 per cent over third-quarter loadings in 1932. Coal and coke loadings are estimated at 1,374,788 cars, an increase of 11.7 per cent. Loadings of automobiles, trucks and parts are estimated at 54,048 cars, a gain of 49.1 per cent. Loadings of all products are estimated at 4,224,077 cars, an increase of 10 per cent.

Loadings of revenue freight for the week ended on June 24 totaled 604,668 cars, an increase of 16,737 cars above the preceding week, and an increase of 105,675 cars above the corre-

sponding week in 1932, but a decrease of 154,695 cars under the corresponding week in 1931.

Ore loading amounted to 13,532 cars, an increase of 1266 cars above the preceding week. Coal loading amounted to 102,015 cars, an increase of 8411 and coke loading totaled 5646 cars, 748 cars above the preceding week.

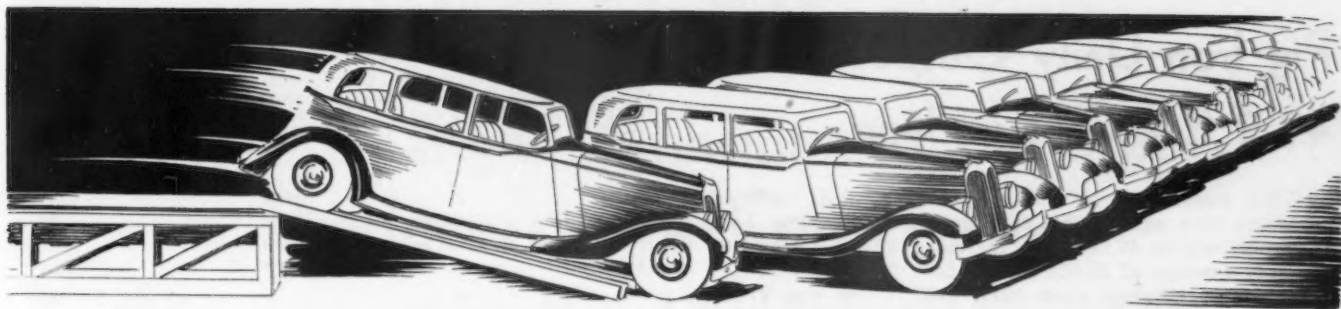
M.T. Taylor Asked to Serve On Trade Relations

WASHINGTON, July 5.—Secretary of Commerce Roper today announced that he has asked Chairman Myron T. Taylor of the United States Steel Corp. to serve as a member of the committee on international trade relations. This is one of numerous committees set up by Secretary Roper as a part of the business advisory and planning council which was announced June 26. Like many others chosen to serve on committees Mr. Taylor has not announced acceptance.

Secretary Roper also announced that he has asked former president James A. Farrell of the United States Steel Corp. to serve as a member of the subcommittee on the foreign service of the Department of Commerce.



LARGE shop electric welding job gets under way at the East Pittsburgh works of the Westinghouse Electric & Mfg. Co. with the welding of reinforcing ribs on the huge intake gates of Boulder Dam. The section shown is one of six that comprise each of the 32-ft. diameter, 110-ton cylindrical gates. Eight of these gates will control the flow of water from the enormous dam reservoir to 1,000,000 hp. of water wheel generators.



▲ ▲ ▲ THIS WEEK ON THE ASSEMBLY LINE ▲ ▲ ▲

June Car Output Estimated at 250,000 Units; July May Surpass June

DETROIT, July 5.

FINAL figures for June are likely to show that motor car production totaled 250,000 units due to extremely heavy operations during the last 10 days of the month, and there is a strong possibility that July will equal the June record and perhaps surpass it. If the current month's assemblies run ahead of those of last month, it will be the first time since 1924 that July has surpassed June and one of the few occasions in the history of the automobile industry when this has happened. As a matter of caution it should be stated that manufacturers are watching retail sales closely and are ready to drop the production rate precipitately in case the public demand begins to slump. This contingency therefore should be taken into consideration in regard to predictions of July assemblies for the industry. However, the sustained buying movement at a time when business ordinarily tapers off is a continuing source of wonderment to automotive executives and there is nothing on the horizon just now to indicate a diminution of activities this month.

Automobile production in the first half of 1933 ran well over the million mark, probably being near 1,050,000 units, compared with 911,117 units in the same period of last year.

Chevrolet has raised its tentative schedule for July to 70,000 units and with the large volume of orders now being received at the factory it is probable that production will be 80,000 units, or approximately the same number as in June. The Tarrytown, N. Y., assembly plant has been so swamped with orders for Chevrolets and Pontiacs that its overflow business has had to be transferred to Chevrolet's Buffalo plant. Pontiac is planning to make 12,000 units this

month. Chrysler Corp. will turn out about 60,000 units in July, of which 40,000 will be Plymouths, 12,000 Dodges and 8000 De Sotos and Chryslers. In June Chrysler made 5000 more units than in any previous month in its history. In the last 90 days it has added 18,412 workers to its payrolls, bringing the total to 42,368, or about as many men as Ford is today employing at the Rouge plant. The recent reduction in the price of the De Soto has resulted in some 3000 orders piling up at the factory. Chrysler is operating many departments over the Fourth of July week-end, working 24 hr. a day in an endeavor to catch up with orders.

Chrysler Buys Machine Tools

Chrysler Corp. has expended almost \$250,000 in the last two weeks for new and used machine tools to expand its capacity at the Plymouth plant and to enlarge its transmission manufacturing department which is located at the Dodge plant. It is reported that some of the transmission work formerly concentrated at the Newcastle, Ind., factory has been transferred to Detroit and it would not be surprising if all of the activities at Newcastle were eventually moved to this city. Purchases of new equipment are understood to have included 18 gear lapping machines, a battery of internal grinders and a number of gear chamfering machines. This raises Chrysler's total expenditures for machine tools in the last 90 days to about \$325,00.

Ford is reported to have increased its manufacturing rate the past week and to have as its objective the production of 80,000 units during July and the first half of August. It then will shut down for a short vacation period, as is its annual custom. Ford is said to be shipping some of its pig iron and scrap, which has accumu-

lated in large quantities at the Rouge plant, to a Cleveland steel maker. This would indicate that Ford has no intention of operating either its blast furnaces or its open-hearth furnaces in the near future. Incidentally it is good news to pig iron merchants who have been fearful that Ford might dump some of its huge tonnage into the local market. It is said that material progress has been made in the development of the small V-eight, generally referred to as model 44, and that this car may be introduced before October 1, which heretofore has been regarded as the deadline. It is pointed out that Mr. Ford can scarcely view with equanimity Chevrolet's well entrenched position in first place and Chrysler's slipping into second place. A survey made recently by an advertising agency revealed that the public now thinks of Chevrolet instead of Ford as the lowest-priced car.

AUTOMOBILE companies find that one of their main problems is to secure parts and materials to keep abreast of assembly requirements. Steel is no exception and recently deliveries of some items have lengthened to four and six weeks. Buyers are having a particularly hectic time securing sheets. It is notable that in certain cases automotive plants have gratefully accepted sheet steel which a short time ago would have been rejected because of slight but harmless blemishes. In other words, the ridiculously rigid inspection standards of some motor car makers which have caused so much protest on the part of steel mills have voluntarily been relaxed as steel became harder to secure. Some nearby steel companies are losing business because they are booked to capacity and cannot meet deliveries specified by users. One of the larger automobile companies is said to have

(Concluded on Page 59)

Pig Iron Daily Output Up 47.3 Per Cent in June

JUNE production of coke pig iron totaled 1,265,007 gross tons against 887,252 tons in May. The June daily rate, at 42,166 tons, increased 47.3 per cent over the May average of 28,621 tons a day. The daily rate in June was the highest since July, 1931, which was 47,201 tons. The output for the first six months of this year was 4,411,003 tons, against 5,168,814 tons for the corresponding period last year.

There were 90 furnaces in operation on July 1, making iron at the rate of 51,675 tons daily, compared with 63 on June 1, with a daily operating rate of 33,160 tons. Twenty-seven furnaces were blown in and none taken off blast. The Steel Corporation blew in fourteen, independent steel companies put in 12 and the subsidiary of a large manufacturer of household equipment lighted one furnace.

Among the furnaces blown in are the following:

Name of Furnace	Company
Niagara	Tonawanda Iron Corp.
Lackawanna	Bethlehem Steel Co.
Three Cambria	Bethlehem Steel Co.
Sparrows Point	Bethlehem Steel Co.
Aliquippa	Jones & Laughlin Steel Corp.
Campbell	Youngstown Sheet & Tube Co.
Zug	National Steel Corp.
Riverside	Wheeling Steel Corp.
United	Republic Steel Corp.
City No. 1	Sloss-Sheffield Steel & Iron Co.
Madeline	Inland Steel Co.
Two Carrie	Carnegie Steel Co.
Two Duquesne	Carnegie Steel Co.
Two Edgar Thomson	Carnegie Steel Co.
One Ohio	Carnegie Steel Co.
One Monongahela	National Tube Co.
One Lorain	National Tube Co.
Two South Chicago	Illinois Steel Co.
One Gary	Illinois Steel Co.
One Ensley	Tennessee Coal, Iron & Railroad Co.
One Fairfield	Tennessee Coal, Iron & Railroad Co.

The Earlston furnace of the Everett-Saxton Co., Philadelphia, and the Ironton furnace, of the Marting Iron & Steel Co., Ironton, Ohio, are being dismantled, which reduces the total number of available furnaces in the country to 281.

Merchant Iron Made, Daily Rate

1933	Tons	1932	Tons
January	2,602	January	6,256
February	2,863	February	7,251
March	2,412	March	7,157
April	1,908	April	5,287
May	3,129	May	4,658
June	4,088	June	6,090
July	.....	July	3,329
August	.....	August	3,070
September	.....	September	3,213
October	.....	October	4,286
November	.....	November	4,435
December	.....	December	3,674

Daily Average Production of Coke Pig Iron

	Gross Tons	1932	1931
	1933		
January	18,348	31,380	55,299
February	19,798	33,251	60,950
March	17,484	31,201	65,556
April	20,787	28,430	67,317
May	28,621	25,276	64,325
June	42,166	20,935	54,621
½ year	24,536	28,412	61,356
July	.....	18,461	47,201
August	.....	17,115	41,308
September	.....	19,753	38,944
October	.....	20,800	37,848
November	.....	21,042	36,782
December	.....	17,615	31,625
Year	.....	23,733	50,069

Production of Coke Pig Iron and Ferromanganese

	Gross Tons		
	Pig Iron*		Ferromanganese†
	1933	1932	1933
January	568,785	972,784	8,810
February	554,330	964,280	8,591
March	542,011	967,235	4,783
April	623,618	852,897	5,857
May	887,252	783,554	5,948
June	1,265,007	628,064	13,074
½ year	4,411,003	5,168,814	47,063
July	.....	572,296	2,299
August	.....	530,576	3,414
September	.....	592,589	2,212
October	.....	644,808	2,302
November	.....	631,280	5,746
December	.....	546,080	7,807
Year	.....	8,686,443	57,342

*These totals do not include charcoal pig iron. The 1932 production of this iron was 15,055 gross tons.

†Included in pig iron figures.

Production by Districts and Coke Furnaces in Blast

Furnaces	Production (Gross Tons)		July 1		June 1	
	June (30 Days)	May (31 Days)	Number in Blast	Operating Rate, Tons a Day	Number in Blast	Operating Rate, Tons a Day
New York:						
Buffalo	34,428	29,672	4	1,740	2	955
Other New York and Mass.	.....	.....	0	.....	0	.....
Pennsylvania:						
Lehigh Valley	22,217	23,480	2	740	2	690
Schuylkill Valley	12,135	12,143	1	405	1	390
Susquehanna and Lebanon Valleys	.....	.....	0	.....	0	.....
Ferromanganese	2,745	2,745	1	90	1	90
Pittsburgh District	253,892	126,721	18	10,630	10	4,640
Ferro. and Spiegel	3,893	3,203	1	130	1	105
Shenango Valley	46,043	31,844	3	1,535	3	1,515
Western Pennsylvania	33,731	19,793	3	2,300	1	640
Ferro. and Spiegel	6,436	.....	1	250	0	.....
Maryland	57,832	43,298	3	2,255	2	1,395
Wheeling District	111,615	106,182	6	4,010	5	3,665
Ohio:						
Mahoning Valley	165,326	105,782	10	6,130	8	4,765
Central and Northern	145,158	113,211	9	5,570	7	4,300
Southern	29,326	26,165	2	980	2	845
Illinois and Indiana	233,873	167,345	14	10,090	10	6,415
Mich. and Minn.	22,068	14,492	2	920	1	465
Colo., Mo. and Utah	4,129	10,946	1	140	1	135
The South:						
Virginia	.....	.....	0	.....	0	.....
Kentucky	11,946	.....	1	380	1	300
Alabama	66,508	48,583	7	3,325	4	1,800
Ferromanganese	.....	.....	0	.....	0	.....
Tennessee	1,706	1,647	1	55	1	50
Total	1,265,007	887,252	90	51,675	63	33,160

Pipe Lines

Catskill, N. Y., has awarded 450 tons of seamless pipe for Rip Van Winkle bridge foundation to Jones & Laughlin Steel Corp.; Frederick Snare Corp. is general contractor.

Michigan Natural Gas Corp., Mount Pleasant, Mich., W. F. Brown, engineer, has begun surveys for natural gas line from Broomfield, Mich., oil fields to Saginaw, Bay City, Pontiac and Flint, about 155 miles. Line will consist of welded steel pipe from 8 to 20-in. diameter. Program will include plant for securing casing head gas from oil wells and large compression station. Cost over \$2,000,000.

South Penn Oil Co., Bradford, Pa., let contract to Rich & Co., Bradford, for crude oil steel pipe line from Sawyer City to Minard Run, Pa.

Dallas Gas Co., Dallas, Tex., has authorized installation of number of steel pipe lines to replace parts of system. Cost over \$30,000. R. M. Redding is engineer.

Simrall Pipe Line Co., Mount Pleasant, Mich., has authorized 4-in. natural gas steel pipe line from Mount Pleasant to Greendale, Porter Township, about 12 miles.

Frederick Snare Corp., 114 Liberty Street, New York, general contractor, has placed 550 tons of 14-in. seamless steel pipe for Rip Van Winkle bridge, Catskill, N. Y., with Jones & Laughlin Steel Corp.

Price Changes Announced by Steel Producers Are Conservative

Bars, Plates, Shapes and Semi-Finished Steel Reaffirmed for Third Quarter at Unchanged Prices; Sheets Up \$3, Cold Strip and Nails \$5

ASSURED of sustained operations through this month by heavy specifications against expiring second quarter contracts, the steel industry is readjusting its prices in conformity with expected changes in operating costs. All of the revisions thus far made have been conservative and in consonance with the expressed policy of the National Industrial Recovery Administration.

Previous prices on bars, plates, shapes and semi-finished steel were reestablished for the third quarter. Wire prices likewise were reaffirmed, although quotations on nails, long excessively low, were marked up \$5 a ton. Hot-rolled strip and sheets are being quoted at prices originally announced for this quarter but subsequently withdrawn. These quotations represent increases of \$1 a ton on hot strip and \$3 a ton on sheets. Advances in pipe, ranging from zero up to \$7 a ton for the base sizes, merely partially restore sharp reductions made a few months ago. An increase of \$5 a ton on cold-rolled strip is a change that has been sorely needed to bring prices in line with production outlays. Among minor products, track spikes have been raised \$5 a ton for July shipment, but prices on tie plates have been reaffirmed.

THE same caution that has characterized the steel industry's attitude toward prices is manifest in the careful manner in which it is preparing a code. Chief executives of leading companies have given codification their undivided attention for several weeks, but final approval must be given in a general meeting of the entire industry and no call for such a conference has yet been made.

Meanwhile steel output continues to mount. Although the holiday interrupted operations in various finishing departments, notably tin plate mills, steel ingot production did not suffer materially and now stands at 56 per cent of capacity, compared with 53 per cent a week ago. At Chicago operations rose from 55 to 57 per cent, at Buffalo from 48 to 60 per cent, in the Cleveland-Lorain area from 71 to 74 per cent, in the Wheeling district from 85 to 90 per cent, in eastern Pennsylvania from 35 to 40 per cent and in the South from 54 to 79 per cent.

THE blowing in today of two additional blast furnaces in the Pittsburgh district indicates that the sharp upswing in pig iron production, manifest in June, has not yet spent its force. Last month there was a net gain of 27 active stacks and the 90 furnaces in operation on July 1 were making 51,675 tons daily as compared with 63 on June 1 operating at a

rate of 33,160 tons a day. The month's production was 1,265,007 tons or 42,166 tons a day, compared with 887,252 tons, or 28,621 tons daily, in May, an increase on a daily basis of 47.3 per cent. The daily average in June was the highest since July, 1931.

Pressure for steel on the part of automobile manufacturers is increasing. Certain steel companies which have been operating full on motor car business are now losing orders because they cannot meet deliveries specified by users. Motor car output in June is estimated to have totaled 250,000 units, and there is a strong possibility that July production will be fully as large.

STEEL demand is steadily becoming more diversified. Railroad orders for material for car repairs, originally placed for forward shipment, are being released in many cases for immediate delivery, indicating that the carriers are commencing to feel the effects of increased freight traffic. Signs of a possible revival of building construction are seen in inquiries for an increasing amount of private structural work. Scattered orders and inquiries for line pipe and heavier tank awards suggest a recovery of activity in the oil and gas industry. Plate awards of the week, accounted for in large part by tank lettings, total nearly 15,000 tons. Farm equipment manufacturers are steadily increasing their operations on replacement parts.

Although considerable recent buying of steel may have been for stocking purposes, it is also true that consumption is steadily gaining, in some instances forcing buyers to make immediate use of their inventory material.

FABRICATED steel awards, at 6850 tons, are the smallest with one exception since the middle of May. The administration's public works program has not yet been translated into steel orders. Of projected Government undertakings perhaps the Navy program will get under way first. Bids will be taken from private yards on 21 vessels July 26 and orders for 16 vessels will be allotted among Government yards. Los Angeles has placed orders for 7746 tons of cast iron pipe.

Ferromanganese has been advanced \$14 a ton to \$82, seaboard, and spiegeleisen has been raised \$3 a ton to \$27, furnace. Scrap prices are still rising. Advances in heavy melting steel at Chicago and Philadelphia have caused THE IRON AGE composite for scrap to rise from \$10.08 to \$10.54 a gross ton. Higher prices on pipe, sheets and strip have raised THE IRON AGE composite for finished steel from 1.904c. to 1.973c. a lb. The pig iron composite is unchanged at \$15.01 a gross ton.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	July 5, 1933	June 27, 1933	June 6, 1933	July 5, 1932
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$16.34	\$16.34	\$16.34	\$14.34
No. 2, Valley furnace.....	15.50	15.50	15.50	14.50
No. 2 Southern, Cin'tl.....	16.51	16.51	16.51	13.82
No. 2, Birmingham.....	12.00	12.00	12.00	11.00
No. 2 foundry, Chicago*.....	16.00	16.00	16.00	15.50
Basic, del'd eastern Pa.....	16.09	16.09	16.09	15.50
Basic, Valley furnace.....	15.00	15.00	15.00	13.50
Valley Bessemer, del'd P'gh..	17.89	17.89	17.89	16.89
Malleable, Chicago*.....	16.00	16.00	16.00	15.50
Malleable, Valley.....	15.50	15.50	15.50	14.50
L. S. charcoal, Chicago.....	23.17	23.17	23.17	23.17
Ferromanganese, seab'd car- lots.....	82.00	68.00	68.00	68.00

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$40.00	\$40.00	\$40.00	\$43.00
Light rails at mill.....	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh..	26.00	26.00	26.00	26.00
Sheet bars, Pittsburgh.....	26.00	26.00	26.00	26.00
Slabs, Pittsburgh.....	26.00	26.00	26.00	26.00
Forging billets, Pittsburgh...	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh.....	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb....	1.60	1.60	1.60	1.60

Finished Steel

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.60	1.60	1.60	1.60
Bars, Chicago.....	1.70	1.70	1.70	1.70
Bars, Cleveland.....	1.65	1.65	1.65	1.65
Bars, New York.....	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh.....	1.60	1.60	1.50	1.60
Tank plates, Chicago.....	1.70	1.70	1.70	1.70
Tank plates, New York.....	1.598	1.598	1.598	1.898
Structural shapes, Pittsburgh..	1.60	1.60	1.60	1.60
Structural shapes, Chicago...	1.70	1.70	1.70	1.70
Structural shapes, New York..	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh..	1.70	1.70	1.70	1.70
Hot-rolled strips, Pittsburgh..	1.60	1.55	1.55	1.45
Cold-rolled strips, Pittsburgh..	2.00	2.00	2.00	2.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Finished Steel	July 5, 1933	June 27, 1933	June 6, 1933	July 5, 1932
<i>Per Lb. to Large Buyers:</i>				
	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.25	2.10	2.10	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill..	2.35	2.20	2.20	2.30
Sheets, galv., No. 24, P'gh...	2.85	2.70	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill.....	2.95	2.80	2.80	2.95
Hot-rolled sheets, No. 10, P'gh	1.05	1.50	1.50	1.55
Hot-rolled sheets, No. 10, Chi- cago dist. mill.....	1.75	1.60	1.60	1.65
Wire nails, Pittsburgh.....	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill..	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh.....	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill..	2.15	2.15	2.15	2.25
Barbed wire, galv., P'gh.....	2.35	2.35	2.35	2.60
Barbed wire, galv., Chicago dist. mill.....	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh..	\$4.25	\$4.25	\$4.25	\$1.75

Old Material

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh....	\$11.75	\$11.75	\$11.75	\$8.25
Heavy melting steel, Phila....	10.00	9.25	9.25	6.25
Heavy melting steel, Ch'go...	9.87 1/2	9.25	8.75	4.75
Carwheels, Chicago.....	9.50	9.50	9.50	5.50
Carwheels, Philadelphia.....	10.25	10.25	10.25	8.00
No. 1 cast, Pittsburgh.....	10.50	10.50	10.50	9.00
No. 1 cast, Philadelphia.....	10.25	10.25	10.25	8.00
No. 1 cast, Ch'go (net ton)...	8.75	8.75	8.75	6.00
No. 1 RR. wrot., Phila.....	10.75	10.75	10.75	8.50
No. 1 RR. wrot., Ch'go (net)..	6.50	6.50	6.50	3.75

Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$2.00	\$2.00	\$1.75	\$2.00
Foundry coke, prompt.....	2.75	2.75	2.50	3.00

Metals

<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Electrolytic copper, refinery..	8.25	7.75	7.75	5.12 1/2
Lake copper, New York.....	8.50	8.00	8.00	5.50
Tin (Straits), New York.....	46.50	46.00	42.12 1/2	20.37 1/2
Zinc, East St. Louis.....	4.50	4.35	4.30	2.67 1/2
Zinc, New York.....	4.87	4.72	4.67	3.04 1/2
Lead, St. Louis.....	4.15	4.05	3.95	2.60
Lead, New York.....	4.30	4.20	4.10	2.75
Antimony (Asiatic), N. Y....	6.50	6.50	6.35	5.00

▲▲▲ The Iron Age Composite Prices ▲▲▲

Finished Steel			Pig Iron		Steel Scrap	
July 5, 1933	1.973c. a Lb.		\$15.01 a Gross Ton		\$10.54 a Gross Ton	
One week ago	1.904		15.01		10.08	
One month ago	1.892c.		15.01		9.92	
One year ago	1.976c.		13.76		6.42	
Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.			Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.		Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.	
	HIGH	LOW	HIGH	LOW	HIGH	LOW
1933	1.973c., July 5;	1.867c., Apr. 18	\$15.01, May 29;	\$13.56, Jan. 3	\$10.54, July 5;	\$6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 5
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 3
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Price Revisions Feature Pittsburgh Market



Pipe, Wire Products, Strip and Sheets Are Advanced — Bars, Plates and Shapes Unchanged for Third Quarter — Two Blast Furnaces Added

PITTSBURGH, July 5.—With specifications against old low-priced contracts for finished steel products not generally completed, the industry has turned its attention to prices which have been readjusted in accordance with manufacturing costs. Advances have been made on sheets, strip steel, pipe, merchant wire products and railroad spikes, while quotations on bars, plates and shapes, semi-finished steel and other less active commodities have been reaffirmed for the third quarter.

In cases where the new price levels are considerably higher than recent going quotations, production costs have been the governing factor in accordance with the provisions of the Industrial Recovery Act. On bars, plates and shapes strict adherence to the recent quoted price of 1.60c., Pittsburgh, will be an advance to many large users, as it is the intention of mills to adhere strictly to a one price policy to all consumers. The \$7 a ton advance in pipe prices brings discounts on the base and smaller sizes to the same level which prevailed in the first quarter. Sheet quotations, as announced by the leading interests, are in line with prices tentatively announced by several independents a few weeks ago.

On both sheets and merchant wire products quarterly contracts will require shipment by Sept. 30 rather than by the middle of the following month, as has been the case heretofore.

The raw material markets are unchanged with the exception of ferromanganese and spiegeleisen, which have been advanced. Pig iron sellers are unwilling to take business beyond July 31, and the scrap market is stationary partly, because of the unwillingness of dealers to make commitments.

Recent heavy specifications on tonnage products, such as sheets, tin plate, bars and strip steel, will keep mills well occupied during the month of July, even though releases fall off with the expiration of old low-priced contracts. On tin plate, mills are committed at the present capacity rate for at least two months. Railroad purchases are still lacking, and structural steel tonnage is light because of deferred Federal activities. Miscellaneous manufacturing consumers

and jobbers are now fairly well stocked, and further gains in tonnage are unlikely this month. Nevertheless it is believed that finishing mill schedules will not be revised downward immediately, and if so, not to any marked extent.

Steel ingot production in the Pittsburgh district is unchanged at 45 per cent of capacity, if considered on a daily basis. The holiday was observed in most plants with a resultant curtailment in tonnage output. In the valleys and nearby northern Ohio mills steel production is well sustained at 55 per cent, with slightly higher schedules at some points to make up for the holiday. Wheeling district production has been further boosted to 90 per cent of capacity.

The effects of the holiday in finishing mill operations were more pronounced in tin plate, on which at least three turns were lost at most plants. As a result production this week will not average over 80 per cent of capacity. On other products on which full schedules are not being carried out, the lost time can be made up.

Pig iron production continues to rise in the Pittsburgh district, with two additional independent blast furnaces scheduled to resume today.

Pig Iron

Shipments continue to improve, but there has been no further gain in new buying. Large users generally are covered for the quarter and sales are confined for small lots for immediate shipment. Prices are very well held and producers will quote only for July shipment in anticipation of higher prices.

Semi-Finished Steel

The Carnegie Steel Co. has opened its books for the third quarter, with the price of billets, slabs and sheet bars unchanged at \$26, Pittsburgh or Youngstown. Forging billets are also quoted at the usual \$5 a ton premium over the rerolling grade. Makers of wire rods have made no announcement regarding third quarter prices but are taking business for July delivery at \$35, Pittsburgh or Cleveland.

Rails and Track Accessories

The price of railroad spikes has been advanced \$5 a ton, bringing this commodity back to the 2.40c. level which prevailed prior to a decline dur-

ing the first quarter. No changes have been made on other accessories. Specifications were fairly heavy at the month-end and shipments during July promise to be much larger than seasonal expectations would warrant. No new rail tonnage has been booked by the local mill but specifications are being accumulated for a short run during the month.

Bolts, Nuts and Rivets

Demand is holding up unusually well and several producers in the district are engaged at better than 50 per cent of capacity. Present discounts on bolts and nuts and small rivets are being extended throughout July and no action on price has been taken for the remainder of the quarter.

Bars, Plates and Shapes

The Carnegie Steel Co. has announced that its third quarter price on the heavy hot-rolled products will be unchanged at 1.60c., Pittsburgh. At the same time it is indicated that this minimum will be adhered to rigidly, with the result that many large contract buyers will probably be forced to pay at least \$2 a ton more than in the past quarter. This applies to cold-finishing mills, which may also be assessed a further extra for cold-drawing quality. Producers expect to complete shipments this month on the greater part of the low-priced contract business now on their books, although protection given on construction jobs will naturally be continued. On reinforcing bars, July 6 has been fixed as the date when all quotations under the recently established prices are to be withdrawn.

Specifications for bars were particularly heavy in the last week of June. Mills are now running at at least 40 per cent of capacity, although plate and structural mills are not nearly so busy. Barge, brewery and tank work continues to dominate the plate market. New structural inquiry involves an increasing amount of private work, but most of the jobs are small. Buying by the railroads is still largely lacking, although some quarterly requirement contracts are being closed.

Cold-Finished Steel Bars

Makers have not opened their books for third quarter, but are protected during July by their sources of steel supply and are taking business for that period at the base price of 1.70c., Pittsburgh. Releases are well sustained, but have shown no further expansion.

Tubular Goods

A new extra card issued on July 1 by the National Tube Co. restores the base discount of 67½ per cent on 1 to 3-in. butt-weld pipe which prevailed prior to March 29 when the price was reduced \$7 a ton. On the smaller sizes of pipe similar price advances have been made, but increases on the larger sizes of lap-weld material are smaller, with material 9-in. and larger O. D.

unchanged. New cards have also been issued on line pipe, merchant casing and wrought steel pipe. No change has yet been made on boiler tubes or mechanical tubing. Makers of wrought iron pipe are expected to advance prices in the near future in order to maintain the usual relationship with steel pipe.

Wire Products

An advance of \$5 a ton in all merchant wire products and \$6 on bale ties has been announced by the leading interest. The new prices are effective immediately and apply through September, with the stipulation that shipments must be completed before the end of that month. However, many buyers are covered through July at the old levels with shipments to be completed by Aug. 15. Manufacturers' wire is unchanged at 2.10c., Pittsburgh, although some mills will take business only for the current month. Under the new schedules nails are quoted at \$2.10 a keg, Pittsburgh.

The Wheeling Steel Corp. has announced a price of \$2.65 a keg for cut nails in carloads, with a 10 per cent discount allowed on size extras. Less-than-carload lots of 5 kegs or more are quoted at \$2.90 a keg, Pittsburgh, and lots of less than 5 kegs at \$3.05, both without the discount on size extras.

Sheets

Price uncertainty has been relieved by an announcement of third quarter quotations by the American Sheet & Tin Plate Co., which will probably be followed by the rest of the industry. The new figures are essentially the same as those brought out several weeks ago by several independent companies and later withdrawn. They represent advances of \$2 to \$7 a ton over prices at which much tonnage has recently been moving and are as follows: hot-rolled, 1.65c.; hot-rolled annealed, 2.25c.; galvanized, 2.85c.; light cold-rolled, 2.60c.; automobile body, 2.60c.; long ternes and enameling stock, 2.90c., and tin mill black plate, 2.50c., all f.o.b., Pittsburgh. The prices apply for the entire quarter, but shipment must be made against contracts prior to Oct. 1, rather than Oct. 15, as has been possible in the past. In the meantime, specifications against old contracts have been especially heavy and mills have built up backlogs which assure a continuation of the present 50 per cent operating rate throughout the greater part of July.

Tin Plate

Hot weather affected tin plate output adversely last week and production amounted to scarcely 95 per cent of the industry's physical capacity. The holiday is being generally observed this week, eliminating three or more turns and output will average only about 80 per cent. No change

has been made in the \$4.25 a base box, Pittsburgh, price, even though the cost of tin has advanced sharply.

Strip Steel

Advances of \$5 a ton on cold-rolled strip and \$1 a ton on hot-rolled have been announced by the Republic Steel Corp. and the Weirton Steel Co., respectively, and are being followed by the rest of the industry. Hot-rolled is now quoted for the third quarter at 1.65c., Pittsburgh, and cold-rolled at 2.25c., Pittsburgh or Cleveland. A number of large consumers had already been covered for the quarter at the old prices of 1.60c. and 2c., but producers had recently been quoting only for July and the higher figures are expected to apply rather generally to shipments after the middle of August. Current shipments at much lower levels should be completed by July 15. Cooperage stock is quoted at the same level as hot-rolled strip.

Coal and Coke

The market is rather quiet, although labor troubles continue in the Connellsville Region. Many independent mines and ovens are down, but other mines are operating steadily at wage advances of as much as 25 per cent. The coke market is strong, although prices still lack uniformity. By-prod-

uct coking coal is virtually unobtainable in the open market and the price is nominal.

Ferroalloys

Makers of ferromanganese have advanced the price on domestic material \$10 a ton to \$82, seaboard. For contracting purposes the new price applies only for the third quarter. Shipments at lower figures are being rapidly completed and demand continues to improve.

Scrap

Although mill purchases of No. 1 heavy melting steel are expected momentarily in this district, the last week has been very quiet, with scarcely any significant transactions. Dealers feel that the next sales will be made at \$12, representing an advance of 25c. a ton since the last consumer purchase, and one broker is reported to be paying \$12.25 for a point at the outskirts of the district. Nevertheless, the market is quotably unchanged, although steel is termed very strong. No. 2 steel is slightly higher, and the scarcity of blast furnace scrap and machine shop turnings has forced dealer offering prices to higher levels. The monthly list of the Baltimore & Ohio contains 8400 tons, including 1500 tons of No. 1 heavy melting steel.

Cincinnati Iron Sales Highest in Three Years

CINCINNATI, July 5.—June sales of pig iron in this district were well in advance of any previous month during the past three years. Melters, who had been out of the market for some time, covered during the past month, while others increased their inventories in anticipation of trade improvement. Shipments against old contracts were better and furnace representatives indicate that many consumers are catching up on the contract rate. The closing week of the quarter resulted in a slackening of demand as compared with the previous period, since melters were covered before the effective date of the withdrawal of Northern prices. No change in announced quotations on pig iron has been made, but an early rise in Northern schedules is inevitable since these furnaces have virtually withdrawn from the August and September market.

With the announced policy of Southern furnaces to stay 50c. below the Northern delivered prices in this district, any rise in Northern prices will bring a corresponding advance in Birmingham schedules. The melt generally has improved, but with machine

tool foundries still sluggish the improvement is not evenly distributed.

Coke

An increase in by-product foundry coke prices of 50c. a ton became effective July 1, the present delivered price in Cincinnati being \$8.59. Domestic coke quotations also advanced 25c. Business is without feature, although shipments continue to be good.

Steel

Sheet bookings, the past week, were equal to about 70 per cent of capacity and rolling schedules have been stepped up correspondingly. Despite the heavy bookings, mill interests report that speculative buying is almost nil. The leading interest has announced new prices for immediate acceptance, with a tentative limitation as of Aug. 15. No guarantee of the retention of these quotations is given. The schedules include: cold-rolled sheets, 2.60c., Pittsburgh; hot-rolled, 1.65c.; long ternes, 2.90c.; galvanized, 2.85c.; hot-rolled annealed, 2.25c.

Scrap

Despite increases in the more important grades, those holding material are still reluctant to release enough to permit trading. Mills are still taking scrap on contract, but refuse to make price offerings sufficiently attractive to bring out more material.

Chicago Operating Rate Reaches 57 Per Cent



Weekly Average Will Be Adversely Affected by Holiday Interruption — Scrap Continues to Advance

CHICAGO, July 5.—Ingot output has forged ahead another two points to 57 per cent of capacity. However, the average for the week may be somewhat less than this because the Fourth of July is recognized as a steel mill holiday.

Prices remain firm, with Chicago sellers still adhering to the policy of quoting only for the month of July and for shipment at the convenience of the mills. Both sales and specifications of finished steel are holding previous gains and, despite additions of open-hearth furnaces, deliveries on all commodities are slowly being extended. Orders, though individually larger, still reflect some caution on the part of buyers. However, when an order is placed it is invariably the desire of the purchaser to have delivery at the earliest possible date.

Plate tonnage is prominent in current business, recent awards accounting for close to 10,000 tons. This total includes steel for an oil refinery, the needs of two Milwaukee brewers, and some miscellaneous tank requirements.

Buyers of scrap are offering stronger resistance to the price ideas of dealers, who are convinced that prices are certain to go higher. As measured by mill operations, sales of heavy melting steel are small. Dealers who have accumulations, some of which have been held for a long time, will dispose only of small lots at a time in an effort to obtain a higher average price.

Both mills and bending shops are busier in supplying reinforcing bar needs as Illinois and neighboring States resume their road programs.

Pig Iron

June shipments of Northern foundry iron exceeded those of May by 20 per cent and the opening days of July indicate that the trend is still upward. Prices are firm at \$16 for shipment in July. Both sales and inquiries are growing, but the tonnage added to books in recent weeks has been held back somewhat by the unwillingness of furnaces to take business beyond the end of this month.

Rails and Track Supplies

Releases against old contracts are very light and one Chicago rail mill is idle. New business is lacking and

sellers do not anticipate orders until next fall. Track accessory business is steady and prices are firm.

Plates

Two brewers at Milwaukee have placed a total of 3500 tons of plates, and an oil refinery in Texas will require about 400 tons. This business, added to the expanding requirements of the railroads for heavy car and locomotive repair work, makes plate business the best that has been experienced in many months. Prices remain at 1.70c. a lb., Chicago, for shipment at the convenience of the seller during the month of July.

Structural Material

Although awards are not heavy, they clearly mark the return of highway bridge jobs to the open market. The State of Oklahoma will buy 1200 tons for bridges, and several large tonnages are in the market from States in the Rocky Mountain region. Some railroad business is out on inquiry and some private work is represented in the week's business.

Reinforcing Bars

Bending shop operations are gaining and the promise is that they will go to higher levels. Most of the Midwestern States are releasing tonnages for old road work, and plans for new projects are rapidly taking shape. Work for the Sanitary District, Chicago, may soon start, thereby not only releasing large old orders but also bringing new tonnage into the market. An industrial plant in Minnesota calls for 600 tons of bars. Mill shipments are heavier, since dealers are not only taking more bars for shop use but also to build up their stocks.

Wire Products

Sellers have announced third quarter prices, some of which are above recent levels. Orders continue to flow in freely from manufacturing centers, where part of the tonnage received is going into stocks and part into manufactured products. It is this accumulation of stocks both of wire and finished products that leads some sellers to wonder what the course of the market will be late in the summer. There is a fair movement of nails, but most of the tonnage is going to dealers who are replenish-

ing stocks. There is a lull in demand from most farm areas, especially from those in the Missouri River Valley where drought has severely damaged crops.

Bars

Railroad accessory manufacturers are rapidly stepping up production and are now taking an impressive quantity of bars. Specifications from automobile manufacturers continue to grow, and farm equipment builders have reached a rapid pace in the manufacture of replacement parts. Demand for bars is heavier than for any other finished steel product.

Sheets

Both new business and specifications have reached new high levels, and output ranges from 60 to 65 per cent of capacity. Deliveries are gradually being pushed ahead, promises on the galvanized product now being three to four weeks. Quotations are on the basis of the month of July with shipment at the convenience of mills.

Cast Iron Pipe

Of particular promise in this market is the work which may soon get under way for the Sanitary District, Chicago. There is a large tonnage of pipe previously purchased but not specified for this work. All of this will be ordered out as soon as work gets under way. Further, new plans will be prepared which will bring additional large tonnages into the market. Chicago has placed 1400 tons with two bidders and now announces that it will open bids on July 7 on an additional 875 tons. The general run of inquiries shows some improvement.

Coke

By-product foundry coke prices are firm at \$7.50 a ton, local ovens, for delivery in the month of July. Contracts for the last half of the year will be accepted subject to the condition that the price be confirmed the first of each month.

Scrap

There is no longer hesitancy on the part of brokers to pay \$9.75 a gross ton for heavy melting steel and prices to consumers have reached \$10 a ton. The rerolling rail market is quiet. Offerings are not large and mills have large stocks on hand. However, demand should increase for the reason that road programs requiring large tonnages of rail steel reinforcing bars are now being released. Steel foundries, though taking more scrap, continue to buy cautiously, and demand from gray iron foundries is light and spotty. Railroad offerings are small and sometimes major grades are absent from lists. For instance, a recent list issued by the Milwaukee Road did not contain heavy melting steel.

Little Speculative Buying in Eastern Pennsylvania



Steel Output Rises to 40 Per Cent of Capacity—Advance in Heavy Melting Steel Features Stronger Scrap Market

PHILADELPHIA, July 5.—Mailed before expiration of the second quarter, specifications against old contracts continued to be received by mills early this week. These releases mark the cleaning up of second quarter bookings and have left the mills with comfortable rolling schedules. While deliveries vary, they are slowing up and on the heavier orders, especially for sheets, now range from two to three weeks.

While it is evident that there has been speculative buying in anticipation of higher prices, it has not reached the proportions that had been expected. Some steel makers estimated that of the buying of the past week approximately 20 per cent was of a speculative character. At the same time it has been found that buyers of both pig iron and steel who were expecting to stock part of their tonnages have found that demands coming to them have picked up, with the result that they have been compelled to use their material for immediate consumption.

An interesting development is the increase in emergency orders. This has been reflected particularly in railroad repair orders. Originally some of these had been placed for future shipment, but, owing to the increase in freight traffic, they are being ordered for immediate delivery. Railroad buying consists chiefly of plates, shapes, bars and spikes. Indications are that there will be early purchases of track accessories, followed by larger buying in the fall of material for cars and locomotives.

Mills in this district are not quoting beyond July for shipment up to Aug. 15. Except for sheets second quarter levels are quoted. On sheets an advance of \$3 per ton has been announced.

Open-hearth operations in this district have been stepped up five points to 40 per cent of capacity.

Pig Iron

Demand has slowed up somewhat, but orders during the past week have left furnaces with rather heavy backlogs. Shipments are from three to four times as heavy as those of May. Ferromanganese makers have seen a sharp stimulus in demand for ship-

ments at the old contract price of \$68 per ton, now increased \$14 to \$82, in carload lots, Atlantic seaboard, for third quarter. The new ferromanganese contracts call for minimum and maximum monthly requirements.

Plates, Shapes and Bars

Mills experienced comparatively heavy specifications during the final days of the second quarter and now have larger bookings than at any previous period of the year. Second quarter levels have been extended through July for shipment up to Aug. 15, but are made subject to changes that may arise from the National Recovery Act code. The American Steel Engineering Co., Philadelphia, has been awarded the contract for the reinforcing work for the Pennsylvania Railroad pier at Baltimore. About

Scrap Higher at Boston; Pig Iron Less Active

BOSTON, July 5.—The pig iron market is less active, aggregate sales for the week amounting to about 1700 tons, as against more than 4000 tons in the previous week. The largest transaction involved 1000 tons of No. 1 iron for third quarter delivery, supposedly Port Henry iron, taken by the Westinghouse Electric & Mfg. Co., Springfield, Mass. Most other furnaces will not sell for delivery beyond July 31, and as foundries are well covered for this month, current sales probably will be small.

The New England melt is slowly increasing. Printing press manufacturers generally are quiet, but machine-tool builders, especially in Connecticut, are securing some orders and increasing their melt of iron.

Local scrap prices in most cases are higher, brokers being forced to advance them to secure material. No. 1 heavy-melting steel is generally \$5.75 to \$6.10 a ton, on cars shipping point, or \$11.50 to \$12 a ton, delivered Pittsburgh territory, an advance of 25c. a ton. Shafting has advanced 50c. a ton, steel turnings and blast furnace scrap 75c., bundled skeleton and forge flashings \$1, No. 2 steel 25c. to 50c., textile machinery cast \$1, and No. 1 machinery cast 50c. Heavy

1700 tons of reinforcing steel bars will be required.

Sheets

Sheet mills not only experienced heavy specifications during the last week of the second quarter but are receiving a substantial volume of new business at the new prices, which represent an increase of \$3 a ton, and are being quoted for July for shipment up to Aug. 15. Philadelphia delivered prices now are: hot-rolled No. 10, 1.96c.; hot-rolled No. 24, 2.56c.; heavy cold-rolled No. 10, 2.46c.; light cold-rolled No. 20, 2.91c. Many buyers are pressing mills for delivery. This is especially true of automotive body builders. Deliveries vary from two to three weeks.

Imports

The following iron and steel imports were received here last week: 6500 tons of manganese ore from British West Africa, and 925 tons of pig iron from British India.

Scrap.

The market has become stronger, with a number of increases ranging from 50c. to \$1 per ton. No. 1 heavy melting steel has risen to \$10. Among sales of the past week, made to a nearby consumer, were 5000 tons of No. 2 heavy melting steel at \$9, delivered, and 2500 tons of blast furnace scrap at \$7, delivered.

breakable cast and engine blocks are selling at practically the same prices quoted June 1. Business, even at the higher prices, is not active, because owners of scrap are inclined to hold for still better prices.

Birmingham Steel Rate Highest Since May, 1930

BIRMINGHAM, July 5.—Another blast furnace was added to Birmingham's active list on Saturday, this being Fairfield No. 5 of the Tennessee Coal, Iron & Railroad Co., which went in on basic. This raised the number of producing stacks to seven. Within the past ten days there has been a gain of three active furnaces. The Tennessee company is now operating three, Sloss-Sheffield Steel & Iron two, while Republic Steel and Woodward Iron each have one. Republic Steel has changed its furnace from basic iron to foundry iron and there are now three furnaces on basic and four on foundry.

Birmingham merchant producers begin the third quarter with a substantial tonnage on their books—more than had been booked ahead at the start of the last quarter. Most of the active foundries have now covered their expected requirements for the next three months. The base quotation of \$12 has not been changed and

business is still being taken at that figure. However, no further third quarter tonnage is being accepted.

General upward revisions in scrap prices have been made.

Steel

This week open-hearth operations will advance to the highest point of the past three years. Nineteen of the 24 open-hearths in Alabama are scheduled for production. Not since May, 1930, has that figure been reached. The Tennessee Coal, Iron & Railroad Co. will start five open-hearths at Ensley today (Wednesday) and will continue all nine at its Fairfield Works, making 14 active out of a total of 18. The open-hearth plant at Ensley had been shut down since May 21, 1932. Gulf States Steel is operating five of its six open-hearths. Last week 14 open-hearths were active, a gain of one over the preceding week.

Steel bookings in most all lines continued in good volume throughout the month. The outlook for July is just as good. Railroad tonnage was large enough to provide for the re-opening of the Ensley rail mill on July 10, as previously reported, for a run of several weeks.

Prices for the third quarter were announced on Saturday. Bars, plates and structural shapes remain at 1.75c., Birmingham, but sheets are up \$3 a ton from the minimum base of the past quarter. No. 10 hot-rolled is now 1.80c. a lb., Birmingham, No. 24 hot-rolled annealed 2.40c., and No. 24 galvanized 3c.

Los Angeles Takes Bids on Large Plate Job

SAN FRANCISCO, July 3.—Sheets led the anticipated rise in steel prices with an increase of \$3 per ton at the mill. Hot-rolled No. 24 are now quoted at 2.90c., hot-rolled No. 10 at 2.27½c. and galvanized No. 24 at 3.50c., c.i.f. Coast ports.

Awards for the week totaled 862 tons of structural and 2603 tons of reinforcing steel. The heaviest awards were 2200 tons of bars for the Yerba Buena Island crossing on the San Francisco-Oakland bridge to the Pacific Coast Steel Corp. and 525 tons of structural steel for the Key System terminal to McClintic-Marshall Corp. New reinforcing bar inquiries reported for the week totaled 2561 tons, and new structural inquiries, 793 tons. Announcement was made at Los Angeles that the Metropolitan Water District will take bids on 7500 tons of plates and shapes during the next three years, bids being taken for 1790 tons of liner plates and 710 tons of shapes on July 7. Plans for the White Point outfall sewer have been completed at Los Angeles and call for 5700 ft. of 60-in. cast iron pipe, weighing between 2613 and 3146 tons.

Sustained Output in July Assured at Cleveland



Heavy Specifications Mark End of Second Quarter—Operating Rate Up to 74 Per Cent—Price Advances Announced

CLEVELAND, July 5.—With the rush of specifications against expiring contracts the volume of business in all finished steel products has been very heavy and the tonnage was far in excess of that entered in May. June was the best month in two or three years with some of the local sales offices. Mills have accumulated a sufficient backlog of orders to assure good operations through July.

Ingot output in this district, including Lorain, increased three points this week to 74 per cent of capacity. The Corrigan McKinney Steel Co. added another open-hearth furnace, now operating all 14. Cleveland plants are operating at 64 per cent of ingot capacity. There was little interruption in operations on account of the holiday, only one plant in this territory having shut down.

Interest has centered in price changes and this situation has become cleared up on nearly all products by the announcement of prices for either July or the quarter. The second quarter prices of 1.65c., Cleveland, on steel bars and of 1.60c., Pittsburgh, for plates and shapes have been extended to regular contract customers for shipment through July. Current orders from other consumers will be taken at the same prices subject to any advances necessitated by the operation of the Industrial Recovery Act. However, this clause will not be inserted in orders for material taken for July shipment. Some producers have announced that they will maintain regular quotations to those consumers who have been granted concessions. Sheets and hot-rolled strip have been established for July at a \$3 a ton advance over second quarter prices, hot strip being put on a 1.60c base. Nails, barbed wire and fence have been advanced \$5 and bale ties \$6 a ton for the quarter. Steel pipe has been marked up \$2 to \$7 a ton. Track spikes have been advanced \$5 a ton to 2.40c. a lb. for July shipment. Second quarter prices on cold-finished steel bars and wire rods have been reaffirmed for the quarter, and the price on tie plates has been reaffirmed for July.

Pig Iron

There is not much new buying, which evidently is partly due to the

refusal of furnaces to take orders for shipment beyond Aug. 1, because of uncertainty as to production costs. Sales policies for next month will be announced shortly. Shipments in June showed a gain of 40 per cent over May and are expected to hold up to the June level this month. Prices are steady at \$15.50, Cleveland, for foundry and malleable iron for local delivery and outside shipment.

Iron Ore

Water shipments from upper Lake ports during June were 1,280,669 tons, a gain of 380,135 tons over May and an increase of 1,047,112 tons over June last year. Shipments to July 1 were 2,264,413 tons, as compared with 388,456 tons during the same period last year.

Bars, Plates and Shapes

Bar specifications against expiring contracts were very heavy up to the end of the month, both from the automotive industry and from miscellaneous consumers. Some buyers placed stock orders. One mill has withdrawn the \$1 a ton concession from the base to forge shops. There is talk of a \$2 a ton advance on billet steel reinforcing bars to the merchant bar base. Miscellaneous orders for plates and shapes against expiring contracts also were heavy. Activity in the structural field remains light.

Strip Steel

Hot-rolled strip has been definitely established by a leading producer at 1.60c., Pittsburgh, for the third quarter. Two or three other producers are naming 1.65c. for the same delivery. There is still some uncertainty as to cold strip prices. Two or three producers have announced a 2.25c., Cleveland, price for the coming quarter, but others have not yet named prices for that delivery. However, it seems rather probable that the 2.25c. price will be definitely established. One mill has advanced cooperage hoop to 1.75c. for the quarter.

Sheets

The maximum quotations named recently have been established as market prices for July and some mills will accept orders at these prices for shipment until Aug. 15 without revision clauses. This means an advance

of \$3 a ton, although most consumers have ordered enough sheets at old prices to carry them through July or longer. Specifications were very heavy during the week, and some mills have enough tonnage of some grades to keep them engaged nearly through the month. Others expect to clean up on shipments by July 15. Ruling quotations are 1.65c., Pittsburgh, for No. 10 hot rolled, 2.25c. for No. 24, 2.40c. for light cold-rolled (mill run), 2.60c. for No. 20 automobile body and 2.85c. for galvanized.

Wire Products

Nail prices have been advanced \$5 a ton to \$2.10 a keg, Pittsburgh and Cleveland, for the third quarter. Barbed wire and fence have been marked up \$5 a ton and bale ties \$6 a ton for the quarter. The new price on barbed wire is \$2.60 per 100 lb., fence is \$55, base column, and bale ties are \$45, base column. The present price of 2.10c. a lb. on manufacturers' wire has been reaffirmed, as have all other wire prices. A change has been made in the classification of wire products. Mixed carloads carry a 10c. extra and less-than-carload lots a 30c. extra. Joint carloads, carrying a 20c. extra, take the place of pool cars. The

Selling Agent Appointed for St. Louis Pig Iron

ST. LOUIS, July 5.—Hickman, Williams & Co. has been appointed exclusive selling agents for the stock of pig iron approximating 230,000 tons manufactured by and piled in the yards of the St. Louis Gas & Coke Corp'n. at Granite City, Ill., which is now in the hands of a receiver. The pig iron was acquired by the Utilities Power & Light Co., parent corporation of the coke company, through mortgage and later sold to a syndicate formed for its purchase. The selling agent will have the disposition of all contracts as well as new sales. Pending the appointment of the selling agent, shipments were held up, resulting in the sale of several hundred tons of Northern iron of Chicago make. Prices are unchanged, but firm.

Steel

Business in the steel trade is reported to be picking up in all lines except structural steel and railroad materials, which still lag. Sheet prices have been advanced \$3 a ton. Warehouse business for June showed an increase of about 40 per cent over June, 1932, and a good increase over May of this year.

Fabricating plants in the St. Louis district are operating at between 15 and 20 per cent of capacity. Preliminary plans have been drawn for a Federal building in Kansas City, Mo., which will require approximately 5000 tons of structural steel. The Lac-

joint carload price will apply to orders placed by only two buyers. The advance on nails means the withdrawal of the \$1.85 price, which was recently extended for July shipment.

Cold-Finished Steel Bars

The present 1.75c., Cleveland, price for cold-finished bars has been reaffirmed for July specifications.

Bolts and Nuts

Bolt and nut makers received heavy specifications against second quarter contracts taken at the old 75 per cent discount, but there has been little test of the 73 per cent discount placed in effect early in June for July delivery.

Scrap

A Cleveland mill has purchased a small tonnage of scrap for July shipment, paying \$10 for No. 1 heavy melting steel and \$9.50 for No. 2, or 50c. a ton higher than its last purchase during June. A Valley district mill late in the week purchased a substantial tonnage of heavy-melting steel scrap and Valley dealers are offering \$12 for material to fill this order. Local prices have advanced 50c. a ton on both steel-making and blast furnace grades.

lede Steel Co. has been awarded 1000 tons of reinforcing bars for the Federal building at St. Louis.

With the purchase of cement by the Illinois Highway Commission, projects which have been held up for months because of an argument over prices are expected to go forward.

Scrap

The scrap market has been marking time, pending action on the fair practice code under the National Industrial Recovery Act by the Institute of Scrap Iron and Steel this week. Lists sold last week include: Missouri-Kansas-Texas, 1300 tons; Mobile & Ohio, 2000 tons, and Missouri Pacific, 75 carloads. Prices are firm, but unchanged.

Canadian Mill Gets 30,000-Ton Rail Order

TORONTO, ONT., July 3.—Further expansion of business is reported in the Canadian iron and steel industry, and according to recent announcements mill operations for the remainder of the year will at least exceed 50 per cent of capacity. For the first half of the year the operating rate for mills was less than 12 per cent.

Algoma Steel Corp'n., Sault Ste. Marie, Ont., has just received a contract for 30,000 tons of steel rails from the Dominion Government for

the Western division of the Canadian National Railways. The delivered price on the rails is said to be \$44 a ton, and represents a total of \$1,320,000. The Government will guarantee the corporation's bank loan of \$660,000, required to finance the rail order. The Canadian National will take the rails as needed and make payment on delivery.

The Dominion Steel & Coal Co., Sydney, N. S., resumed operations at its plant a week ago. Its rail mill is turning out a 50,000-ton rail order for the Canadian National Railways and, as soon as specifications are received, will start rolling a 3500-ton rail order for the South African government.

The recent reduction in pig iron prices has so far failed to stimulate business. Following a period of several months with no production of pig iron in Canada, three furnaces have been blown in, one at Sydney, N. S., one at Hamilton, Ont., and one at Port Colborne, Ont., and it is stated that with its new rail contract the Algoma Steel Corp'n. will blow in a furnace at Sault Ste. Marie.

Trading in scrap is picking up slowly. Steel scrap is moving against export orders, but there is little demand for domestic consumption. Local dealers look for some revival in business with the two Canadian mills stepping up operations, although both are said to be well stocked at present. Improvement in well drilling activities in Western Canada is expected to bring new business to pipe foundries, which in turn may be reflected in a more active demand for scrap from this source. Price lists are unchanged.

Scrap Advances in Detroit Market

DETROIT, July 5.—Heavy melting steel and other steel scrap items advanced 25c. a ton the past week, and the market is showing increasing strength at the new prices. The Ford Motor Co. is reported to have sold practically all of its accumulated scrap at the Rouge plant, estimated at 50,000 tons. It is known that a substantial tonnage is moving by water to the Buffalo works of a steel maker. Chrysler has shipped the last of its stock of scrap, which it had held for months and recently sold. With the exception of moderate-sized stocks in the hands of several dealers, the only scrap now available at Detroit is the current production by the automotive trade. This relatively short supply of material has given a bullish aspect to the market.

Steel Bookings Largest Since 1930 at New York



Specifications Heavy at End of Second Quarter — Advances Announced on Sheets, Strips, Spikes, Pipe and Ferro- manganese

NEW YORK, July 5.—The closing days of the second quarter brought out a flood of steel specifications. Bookings for June, stimulated by expectations of price advances, were the largest for any month since 1930 and in some cases equaled or approached all of the tonnage specified in the preceding five months.

Cold-rolled strip has been advanced \$5 a ton to 2.25c. a lb., Pittsburgh, and hot-rolled strip has been marked up \$2 a ton to 1.65c. a lb., for third quarter delivery. The prices for sheets originally announced for third quarter but later withdrawn have been readopted. Railroad spikes have been advanced \$5 a ton to 2.40c. a lb., Pittsburgh, for July specification only. Quotations of 1.60c., Pittsburgh, on bars, plates and shapes have been continued for the current quarter. While expected advances on these products did not materialize, the mills will nevertheless better their position through the abandonment of preferential prices. Revisions in pipe discounts, equivalent to advances up to \$7 a ton, have merely wiped out part of the reductions made early in the year. No change in tin plate prices has been announced.

Tin mills are hard pressed to make deliveries, in some cases operating at above theoretical capacity. Heavy domestic demand has been augmented recently, as a result of dollar depreciation, by orders from Japan, Cuba, Canada and Argentina. The oil and gas industry, long dormant, is now placing some steel for refineries and pipe lines. Railroad buying remains very light, although latterly increasing freight traffic has forced moderate purchases of steel for car repairs. An order for 550 tons of 14-in. seamless pipe for the Rip Van Winkle bridge, Catskill, N. Y., has been placed with the Jones & Laughlin Steel Corp. An oil company has bought 10 miles of 4½-in. pipe for Texas delivery.

Pig Iron

Producers continue to quote for July only. Demand is well sustained and prices unyielding. Sales aggregate 3700 tons, as compared with 4000 tons in the previous week and 3000 tons two weeks ago. Whitin Machine Works, Whitinsville, Mass., has purchased 1000 tons. Open inquiry is

negligible, as most of the tonnage is being placed by personal solicitation. Melters covered fairly well during May and are now awaiting an announcement of furnace policy, which is expected near the month's end. Sustained activity in the jobbing foundries was evidenced by the fact that many forsook the usual lay-off for the July holiday. Dealers in this district expect no significant recession of activity during the third quarter. Foreign iron was quiet during the current week. Quotations on import brands are firm, but are still complicated by exchange irregularities.

Ferroalloys

Domestic ferromanganese, 80 per cent grade, in carloads, for third quarter delivery has been advanced \$14 to a basis of \$82 a gross ton, seaboard. For less carload shipment the quotation is now \$89 a gross ton. No change in foreign ferromanganese prices has been announced. Domestic spiegeleisen, 19 to 21 per cent grade, has been established \$3 a ton higher at \$27 a gross ton, furnace.

Reinforcing Bars

Activity is confined to a fairly steady flow of small-lot specifications. Public works are accounting for virtually all tonnages. Prices are unchanged but firm. Mills are expected to announce third quarter quotations near the end of the month; and upward revision is expected but will probably be of nominal magnitude. Johnson, Drake & Piper, Inc., New York, general contractor for grade elimination at Jones Beach, has awarded 365 tons of mesh and bars to Kalman Steel Corp. The largest award for several weeks, amounting to 3300 tons of bars for bridgways at Jones Beach, will be made public within the next few days; Arundel Corp., New York, is low bidder on the general contract. The New York Central Railroad viaduct in New York will require about 750 tons and placement probably will be made next week by James Stewart & Co., low bidder on the general contract.

Scrap

Following a period of lethargy, the local market soared to new heights early this week. Occasioned by active direct bidding by a leading Eastern consumer, No. 1 and No. 2 heavy melt-

ing steels were being moved at \$7.50 and \$6.50 a ton, on barge. Quotations for rail shipment are nominally higher at \$6.50 for No. 1 and \$5.25 a ton for No. 2 steel. Brokers are meeting the new figure to cover for current specifications. Even at this price some restriction is evidenced in the heavy grades. Sellers, encouraged by the general strong tone, are hesitant about making lengthy commitments. All other grades continue to move slowly, although acceptances against existing orders are satisfactory and no slackening of consumer interest is evident. With old contracts practically completed, there has been a sharp decline in loading for export. Foreign buyers, especially Japanese and Italian, have evidenced no recent willingness to bid on a parity with domestic consumers or to buck a gyrating foreign exchange. However, the absence of market weakness is reviving active foreign interest. A tonnage of steel rails, sold for export, brought \$9 a ton, f.a.s. New York. Japanese melters have purchased about 7000 tons of heavy melting grade which will move from a port other than New York. Indications point to an increasing export activity.

Buffalo Steel Output Reaches 60 Per Cent

BUFFALO, July 5.—The Port Colborne, Ont., stack of the Canadian Furnace Company, Ltd., has been placed in blast, making five furnaces now blowing in the Buffalo area. Blast furnace interests are declining to quote ahead for more than one month. Volume of tonnage placed has been fair. One inquiry from New England is for 400 tons of foundry.

Steel

Sixty per cent open-hearth operations in the Buffalo district became an accomplished fact when the Lackawanna plant of the Bethlehem Steel Corp. placed four more furnaces in operation, making a total of 16 units. A local fabricator took two jobs involving 500 tons of structural steel for a Connecticut State bridge at Sandy Hook and 575 tons for a Pennsylvania State bridge at Jersey Shore. A pickup in the volume of small structural business is noticeable.

Scrap

A sale of short mixed borings and turnings at around \$6.75 occurred during the past week. No. 1 machinery cast has been sold at \$11. Short shoveling steel turnings were sold at \$6.50. Considerable scrap is being delivered by water and new orders have been placed for barge delivery of blast furnace scrap. The market is very firm. Dealers are more reluctant to sell and have set a new asking price of \$11 for No. 1 heavy melting steel and \$10 for No. 2 heavy melting steel, though no sales have occurred at these prices.

Valley Operations Maintained at 55 Per Cent; Price Situation is Clarified

YOUNGSTOWN, July 5.—Although announcement of third quarter prices on the majority of finished steel products has been the center of interest during the last week in this district, the month-end rush of specifications cannot be overlooked. Tonnage increased steadily throughout June, and on the basis of current mill schedules, sufficient business accumulated to assure a high rate of shipments throughout July. Much of the tonnage taken is for shipment at the convenience of the producer and even though July 15 has been established as a deadline for shipments against June specifications, mills expect to distribute the tonnage throughout the greater part of the month rather than boost schedules sharply for only a short period.

This procedure will also be followed in the production of pig iron and steel ingots, and it is not unlikely that the steel production rate of slightly over 55 per cent reached last week in the district will represent the peak in the current movement. The holiday this week will be generally observed and will reduce output correspondingly, but the daily rate will not fall under the 55 per cent level. It is possibly significant that Bessemer capacity in the district has been engaged at a higher rate than open-hearth, indicating the heavier requirements of pipe mills.

Local consumers of finished steel in the Valleys are now drawing heavily on mills for sheets, strip steel and bars, to be used for steel furniture, beer cases and barrels, stampings and miscellaneous building products. Shipments to the automotive industry are undiminished, but July tonnage is expected to fall off slightly. Wire products are moving to the agricultural industry in better volume. Demand for pipe is not equal to recent output, a part of which has gone into stocks. Stocks of semi-finished steel have also been built up considerably, although surplus pig iron has been sharply reduced.

Reestablishment of current prices on heavy hot-rolled products and semi-finished steel for the third quarter had been generally anticipated and is in line with the industry's intention to carry out the spirit of the Industrial Recovery Administration. The advance of approximately \$7 a ton in the base price of pipe merely brings discounts down to the level which prevailed in the first quarter, and on the larger sizes the new quotations are still considerably lower than they were in that period. The advance of \$5 a ton, to 2.25c., Pittsburgh or Cleveland, on cold-rolled strip is a readjustment which was sorely needed to bring selling prices in line with pro-

duction costs. Hot-rolled strip at 1.65c., Pittsburgh, is only \$1 a ton over the figure named several weeks ago for third quarter, and considerable business had already been taken at the lower level.

Pig iron sellers are taking business for July only at current levels. The scrap market continues strong with No. 1 heavy melting steel quotable at \$12 to \$12.50.

British Domestic Demand Impresses; Exports Lag

LONDON, ENGLAND, July 5 (By Cable).—A renewal of activity in pig iron is expected after the close of the inventory period. Some furnaces have satisfactory backlogs of orders which will carry them until October. Export demand continues to lag but the domestic demand is improving. The recent removal of the Russian trade embargo is a favorable feature, because Russia, last year, took 30,000 tons of Cleveland steel.

Metropolitan Vickers Electrical Co. has received a £3,000,000 contract for

British Prices f.o.b. United Kingdom Ports

Per Gross Ton			
Ferromanganese, export	£9		
Billets, open-hearth	£5	to £5 7s. 6d.	
Black sheets, Japanese specifications	£11		
Tin plate, per base box	17s. 3d.	to 17s. 6d.	
Steel bars, open-hearth	£7 17½s.	to £8 7½s.	
Beams, open-hearth	£7 7½s.	to £7 17½s.	
Channels, open-hearth	£7 12½s.	to £8 2½s.	
Angles, open-hearth	£7 7½s.	to £7 17½s.	
Black sheets, No. 24 gage	£9		
Galvanized sheets, No. 24 gage	£11	to £11 10s.	

Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$4.86	
*Ingots	£2 5s.
*Billets, Thomas	£2 7s.
Wire rods, No. 5 B.W.G.	£4 10s.
Black sheets, No. 31 gage, Japanese	£11 5s.
*Steel bars, merchant	£2 8s.
*Plates, ¾ in. and up	£3 18s. 6d.
*Plates, 1 in. and 5 mm.	£4 1s.
*Sheets, ½ in.	£4 6s.
*Ship plates	£4 10s.
*Beams, Thomas	£2 16s. 6d.
*Angles (basis)	£3
Hoops and strip steel over 6-in. base	£3 12s. 6d.
Wire, plain, No. 8	£3 7s. 6d.
Wire nails	£5 16s.
Wire, barbed, 4-pt. No. 10 B.W.G.	£3 18s.

*Prices as established by European Raw Steel Cartel.

the electrification of a South American railway.

The tin plate market is quiet with consumers hesitating to place orders. The price tendency is easier because of some reselling.

The Continental steel market is still awaiting the fixing of c.i.f. prices by the European cartel, as well as a settlement of the clause having to do with cash deposits. These details are expected to be arranged some time this week. The cartel has established a price 6 shillings per ton under the general export price for plates and ⅛ in. sheets for the United Kingdom.

International hoop cartel reports a serious lack of business. International Wire Export Co. expects to resume negotiations with American exporters and to agree with them upon minimum prices. Allocation of markets is not anticipated.

International wire rod cartel is to meet in Luxemburg early in September.

Reinforcing Steel

Awards 6550 Tons—New Projects, 3160 Tons

New York, 365 tons, mesh and bars for grade elimination at Jones Beach, to Kalman Steel Corp.; Johnson, Drake & Piper, Inc., New York, general contractor.

Baltimore, 1700 tons, pier for Pennsylvania Railroad, to American Steel Engineering Co., Philadelphia.

State of Kentucky, 300 tons, road work, to an unnamed bidder.

Austin, Minn., 600 tons, Hornel Co., to Inland Steel Co.

St. Louis, 1000 tons, Federal building, to Laclede Steel Co.

Berkeley, Cal., 100 tons, Kress department store, to Gunn Carl & Co.

San Francisco, 2200 tons, Yerba Buena Island crossing on San Francisco-Oakland bridge, to Pacific Coast Steel Corp.

Los Angeles County, Cal., 269 tons, conduit on Ballona Creek, to Concrete Engineering Co.

NEW REINFORCING BAR PROJECTS

New York, 3300 tons, bridgways at Jones Beach; Arundel Corp., New York, low bidder.

State of Indiana, 600 tons, highway bridges.

San Francisco, 140 tons, Irish American Hall; bids July 14.

El Centro, Cal., 933 tons bars, 1100 tons wire mesh for Imperial Inter-Cities Water District.

Los Angeles, 593 tons, sewers in Wilton Place and Second Street districts.

Los Angeles, 895 tons, material for Department of Water and Power, bids July 10.

Trade Notes

Chain Belt Co., Milwaukee, has appointed Lewis E. Tracy Co., Boston, distributor for its line of Rex roller, block and leaf chains and cut tooth sprockets in the Boston territory.

Remington Arms Co. is moving its sales administration department from Wilmington, Del., to Bridgeport, Conn., with E. E. Handy, vice-president in charge.

Permutit Co., manufacturer of water softeners, filters and CO₂ recorders, has moved its general offices from 440 Fourth Avenue, New York, to McGraw-Hill Building, 330 West Forty-second Street.

Fabricated Structural Steel

Awards Light—New Projects in Fair Volume

LETTINGS of 6850 tons are the lowest, with one exception, since the middle of May. The only booking of size was 1065 tons for a State school at Coxsackie, N. Y. New projects of 15,950 tons are swelled by 12,000 tons for a post office at St. Louis, on which bids will be opened Aug. 1. Plate awards again bulk large, calling for 15,285 tons. Fabricated steel contracts in June totaled 65,850 tons, compared with 150,085 tons in May. For the first six months of this year, awards reported to THE IRON AGE totaled 447,550 tons. Structural steel lettings for the week follow:

NORTH ATLANTIC STATES

Sandy Hook, Conn., 500 tons, bridge to Lackawanna Steel Construction Corp.

Coxsackie, N. Y., 1065 tons, State vocational building, to McClintic-Marshall Corp.

Jersey Shore, Pa., 575 tons, bridge to Lackawanna Steel Construction Corp.

Lemoine, Pa., 155 tons, State highway bridge, to Jones & Laughlin Steel Corp.

Erie, Pa., 370 tons, building for Hammermill Paper Co., to Erie Steel Construction Co.

Langhorne, Pa., 137 tons, bridge in Bucks County, to Belmont Iron Works.

Wilkes-Barre, Pa., 700 tons, Y. M. C. A. building, to Anthracite Bridge Co., Scranton, Pa.

Brunswick, Md., 210 tons, Catoclin River bridge to American Bridge Co.

THE SOUTH

Burlington, N. C., 150 tons, McEwan Knitting Mill building, to Carolina Steel & Iron Co.

Houston, Tex., 1000 tons, Southern Pacific passenger station, to Houston Structural Steel Co.

CENTRAL STATES

Toledo, Ohio, 150 tons, building for Libby-Owens-Ford Plate Glass Co., to McClintic-Marshall Corp.

Akron, Ohio, 135 tons, Akron Brewing Co. building, to Burger Iron Co.

Muskegon, Mich., 270 tons, storage building, to R. C. Mahon Co., Detroit.

Detroit, 170 tons, Grand Trunk railroad grade separation, to American Bridge Co.

Schneider, Ind., 185 tons, highway bridge, to American Bridge Co.

Noblesville, Ind., 125 tons, highway bridge, to Pan American Bridge Co., Newcastle, Ind.

Cook County, Ill., 100 tons, grandstand for Fair grounds, to Duffin Iron Co., Chicago.

Hinsdale, Ill., 200 tons, highway bridge, to Midland Structural Steel Co., Chicago.

WESTERN STATES

Oakland, Cal., 112 tons, College of St. Albert, to McClintic-Marshall Corp.

Oakland, 525 tons, Key System terminal, to McClintic-Marshall Corp.

Oakland, 140 tons of sheets, Key System terminal, to Guilfoxy Cornice Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Lewiston, Me., 100 tons, post office.

New York, 700 tons, warehouse for Manhattan Refrigeration Co.

Syracuse, N. Y., 400 tons, farm implement and machinery building for New York State Fair Association.

Syracuse, 350 tons, horticultural building for New York State Fair Association.

Stroudsburg, Pa., 200 tons, apartment building for A. M. Snyder.

Marcus Hook, Pa., 600 tons, building for Congoleum-Nairn, Inc.

CENTRAL STATES

State of Indiana, 225 tons, highway bridges.

Royal Oak, Mich., 285 tons, radio shrine.

Milwaukee Road, 580 tons, underpass at Milwaukee.

St. Louis, 12,000 tons, post office; bids Aug. 1, Klipstein & Rathmann, architects.

WESTERN STATES

Los Angeles, 710 tons, tunnel supports for Metropolitan Water District; bids July 7.

FABRICATED PLATE

AWARDS

Catskill, N. Y., 500 tons, rough welded pipe for Rip Van Winkle bridge, to Bethlehem Steel Corp.; Frederick Snare Corp., general contractor.

Newark, N. J., 750 tons, tanks for Ballantine Brewery, to M. H. Treadwell Co.

Cleveland, 750 tons, tanks for Gulf Refining Co., to Chicago Bridge & Iron Works.

Cincinnati, 545 tons, barges for Union Barge Line, to Dravo Contracting Co.

East Chicago, Ind., 600 tons, tanks for Sinclair Refining Co., to Chicago Bridge & Iron Works.

Milwaukee, 2200 tons, tanks for Pabst brewery, to an unnamed bidder.

Memphis, Tenn., 240 tons, barge for River Terminals Corp., to American Bridge Co.

Texas City, Tex., 1100 tons, furnace building for M. W. Kellogg Co., to Ingalls Iron Works Co.

Texas City, Tex., 8300 tons, tanks for Pan-American Petroleum & Transport Co., to Chicago Bridge & Iron Works.

Houston, Tex., 300 tons, tanks for Sinclair Refining Co., to Chicago Bridge & Iron Works.

NEW PROJECTS

State of Massachusetts, 750 tons, steel water pipes; bids close July 13.

Los Angeles, 1790 tons, tunnel linings for Metropolitan Water District; bids July 7.

Cast Iron Pipe

Commissioner of Institutions and Agencies, State Office Building, Trenton, N. J., asks bids until July 18 for 5000 ft. 6-in. for high level reservoir system, New Jersey Reformatory, Annandale, N. J.

East Lyme Water Co., East Lyme, Conn., plans 6 and 8-in. lines for extensions in system at Saunders Point, Crescent Beach and vicinity. Project will include steel standpipe, about 800,000 gal. capacity. Cost \$100,000.

Board of District Commissioners, District Building, Washington, asks bids until July 12 for 36,500 ft. of 4 to 16-in. water pipe.

Rockford, Ill., plans installation of 16, 12 and 10-in. pipe for trunk lines for extensions and improvements in water system in different parts of city. Entire project estimated to cost over \$150,000.

Chicago has awarded 1000 tons of 12-in. to Glamorgan Pipe & Foundry Co., and 400 tons of 36-in. to United States Pipe & Foundry Co.

Chicago will take bids July 7 on 875 tons of 8-in.

Milwaukee closed bids June 30 on 500 tons of 12-in. class C water pipe.

Los Angeles has completed plans for White Point outfall sewer which will require 2613 to 3146 tons of 60-in.

San Francisco has taken bids on 1595 tons of 6 and 8-in. on which Central Foundry Co. is low bidder.

Los Angeles has awarded 2346 tons to Pacific States Cast Iron Pipe Co., 1600 tons to National Cast Iron Pipe Co., 1500 tons to R. D. Wood & Co. and 2300 tons to United States Pipe & Foundry Co.

Railroad Equipment

Philippine Railroad has placed an order for 35 cane cars with Magor Car Corp.

United States Engineers, New Orleans, will open bids this week for four electrically propelled asphalt cars, each 20 tons capacity.

St. Louis-San Francisco Railway, Frisco Building, St. Louis, has secured permission to make extensions and improvements to cost \$495,077 during next six months, of which about \$238,000 will be expended for rails and track materials. This road last week ordered 4300 tons of rails from the Tennessee Coal, Iron & Railroad Co.

Car Output Estimated at 250,000 Units

(Concluded from Page 47)

quietly stored steel in the last 30 days and with this tonnage plus what it is able to get from the mills is well protected so far as its needs in the next month are concerned. Great Lakes Steel Corp. is operating all six of its open-hearth furnaces and its bar, strip and sheet mills to full capacity. It has been forced to go into the open market a second time to buy sheet bars for its Michigan sheet division because its own semi-finished steel output has been inadequate. Its two new open-hearth furnaces, now under construction, are expected to be ready to operate by Oct. 1.

In the midst of the best demand for motor cars in at least two years, it seems incongruous to find signs of preparation for new models, yet this is the case. Buick has let out the work for a new car and it is believed that a new Buick may be presented to the public in the early fall. There also is evidence that Chevrolet is quietly developing changes for 1934 which may call for substantial expenditures for machine tools within 60 to 90 days. The sustained retail demand for automobiles is believed to have convinced some of the more important manufacturers that sizable capital outlays in tooling up for next year are justified.

Murray Corp. has increased its production of insulated steel beer barrels to 3500 a day. Its steel requirements for this purpose are running about 800 tons a week. It has decided to add to its line a quarter barrel of the same insulated type as the larger half-barrel with deliveries beginning in August. Motor Wheel Corp. has been experimenting with a steel beer barrel and is reported to be likely soon to announce its new product. Briggs Mfg. Co. is said to be preparing to make a wooden barrel.

Copper Rises to 8.50c. a Lb., Though Demand Continues to Lag

Spot Straits Tin Again Higher on Sterling Movements—
Lead and Zinc Enjoy Moderate Price Advances

NEW YORK, July 5.—Shaking off a pre-holiday inertia the domestic copper market in sympathy with a sharp increase in European centers on Monday advanced to 8.25c., Connecticut basis, for electrolytic. A continued buoyant market abroad was instrumental in further advancing the domestic price level today to 8.50c., delivered. Consumer interest was stimulated by the initial advance, but lost considerable momentum with the latter increase. A sufficiently heavy business was booked today to firmly establish a price of 8.50c. Most producers are restricting offerings at that price, however, as they show a preference to await further price developments in European points. A price of 8.75c., Connecticut, was expected this morning, but consumer aloofness evidently discouraged the advance. Lake copper rose at a slightly less rate to 8.50c. a lb., delivered New York.

Foreign metal started the seven-day period at 7.95c., c.i.f. Continental ports, and moved sharply upward during the week to 8.60c. A satisfactory volume of sales was reported at the latter figure. Continued fall of the dollar on foreign exchange was the major factor affecting the price increase.

Tin

With sterling rising abruptly this morning to a new high level at \$4.53, spot Straits tin jumped to 47c. a lb., New York. Sterling fluctuations later in the day caused a reaction in spot Straits at New York to 46.50c. As a result of the nervous exchange situation throughout the week, the tin market here was refractory. Trading was made extremely difficult by the hourly changes in sterling quotations. A fair volume of sales was reported, however, with bookings of English refined tin particularly prominent. The

recent heavy calls for that grade have tended to narrow the premium asked for spot Straits. In London, values eased off sharply during the week with postings today at £225 7s. 6d. a ton for spot standard, £224 15s. for future standard and £234 7s. 6d. for spot Straits. A similar decline was evidenced in the Singapore market, which today was quoted at £230. Deliveries of Straits tin into American consumption during June totaled 5082 tons. During the month the world's visible supply dwindled 1919 tons, leaving 39,964 tons in stock. Visible supply one year ago amounted to 48,945 tons. Eastern carryover for June was decreased 191 tons to 6972 tons.

Copper Averages

The average price of Lake copper for June, based on daily quotations in THE IRON AGE, was 8c. a lb., delivered New York. The average price of electrolytic copper for that month was 7.75c., refinery, or 8c., delivered Connecticut.

Lead

Prices today rose \$2 a ton to 4.30c. a lb., New York, and 4.15c., St. Louis. Market vigor came from the low position of dollar exchange coupled with the well-booked position of the leading refiners. The current market is firm. The semi-holiday position of the trade on Monday did not cause bookings to fall to an unsatisfactory level. Shipment for actual consumption is proceeding at a good rate, and consumption has shown a steady increase during the past month. Smelters have opened books for August, and the volume of inquiry which has already appeared indicates that August tonnage may outrun that of July.

Zinc

While open trading disclosed no significant covering, prime Western scored an advance of \$3 during the past week and is now obtainable in limited quantities at 4.50c. a lb., East St. Louis, or 4.87c. a lb., New York. The strong tone of the Joplin ore market is expected to further tighten the prime Western price position. Restricted tonnages of Joplin ore were available at \$30 during the current week, but principal producers are disinclined to sell as a better price seems imminent. Ore output for the past week was estimated at 4000 tons, a slight drop from the preceding period. Weekly shipments totaled 4200 tons, dropping visible stocks to an estimated 13,400 tons.

Sullivan Machinery Co., Chicago, announces the removal of its St. Louis district sales office, formerly located at 2015 Railway Exchange, and its warehouse, formerly located at Mount Vernon, Ill., to 2639 Locust Avenue, St. Louis. A complete stock of parts for air compressors, hammer drills, drill sharpeners, hoists, coal cutters, coal loaders, cutter bit sharpeners and diamond drills will be carried.

The Week's Prices. Cents Per Pound for Early Delivery

	June 28	June 29	June 30	July 1	July 3	July 5
Electrolytic copper, N. Y.*	7.75	7.75	7.75	7.75	8.00	8.25
Lake copper, New York	8.00	8.00	8.00	8.00	8.25	8.50
Straits tin, Spot, N. Y.	46.50	45.00	44.75	44.75	46.25	46.50
Zinc, East St. Louis	4.45	4.50	4.50	4.50	4.50	4.50
Zinc, New York	4.82	4.87	4.87	4.87	4.87	4.87
Lead, St. Louis	4.05	4.05	4.05	4.05	4.05	4.15
Lead, New York	4.20	4.20	4.20	4.20	4.20	4.30

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse	
Delivered Prices, Base per Lb.	
Tin, Straits pig	48.50c. to 49.50c.
Tin, bar	50.50c. to 51.50c.
Copper, Lake	9.50c. to 10.25c.
Copper, electrolytic	9.25c. to 9.75c.
Copper, castings	9.00c. to 10.00c.
*Copper sheets, hot-rolled	15.62½c.
*High brass sheets	13.25c.
*Seamless brass tubes	14.87½c.
*Seamless copper tubes	15.12½c.
*Brass rods	10.75c.
Zinc, slabs	5.50c. to 6.00c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	5.00c. to 6.00c.
Lead, bar	6.50c. to 7.50c.
Lead, sheets	7.75c. to 8.00c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ¼ and ½	30.00c. to 31.00c.
Babbitt metal commercial grade	27.00c. to 52.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse	
Delivered Prices per Lb.	
Tin, Straits pig	49.50c.
Tin, bar	51.50c.

Copper, Lake	9.12½c.
Copper, electrolytic	9.12½c.
Copper, casting	8.50c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	19.00c.
Babbitt metal, high grade	53.50c.
Solder, ¼ and ½	27.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.00c.
Copper, hvy. and wire	6.25c.	6.75c.
Copper, light and bottoms	5.00c.	5.875c.
Brass, heavy	3.50c.	4.00c.
Brass, light	2.75c.	3.50c.
Hvy. machine composition	4.75c.	5.25c.
No. 1 yel. brass turnings	4.00c.	4.50c.
No. 1 red brass or compos. turnings	4.75c.	5.00c.
Lead, heavy	3.25c.	3.75c.
Zinc	2.25c.	2.75c.
Cast aluminum	6.50c.	7.50c.
Sheet aluminum	11.75c.	13.50c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARs, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.90c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.I.F. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributors)	
F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Reinforced iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.85c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York (standard)	1.598c. to 1.698c.
C.I.F. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.I.F. Pacific ports (wide flange)	2.10c.
C.I.F. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)	
Alloy Quantity Bar Base	2.45c. to 2.65c. per Lb.

Series	Alloy	Differential
Numbers		per 100 Lb.
2000 (1/4% Nickel)		\$0.25
2100 (2 1/4% Nickel)		0.55
2300 (3 1/2% Nickel)		1.50
2500 (5% Nickel)		2.25
3100 Nickel Chromium		0.55
3200 Nickel Chromium		1.35
3300 Nickel Chromium		3.80
3400 Nickel Chromium		3.20
4100 Chromium Molybdenum (0.16 to 0.25 Molybdenum)		0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)		0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.30 to 2.00 Nickel)		1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)		0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)		0.45
5100 Chromium Spring Steel		0.20
6100 Chromium Vanadium Bar		1.20
4100 Chromium Vanadium Spring Steel		0.95
9250 Silicon Manganese Spring Steel (flats)		0.25
Round and Square		0.50
Chromium Nickel Vanadium		1.50
Carbon Vanadium		0.95

Above prices are for hot-rolled steel bars for general quality. The differential for cold-drawn bars is 1/4c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2 1/2 in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill	
1 1/2 in. 3.00c.	
1-3/16 to 1 1/2 in. 2.50c.	
1-9/16 to 1 1/2 in. 2.35c.	
1-15/16 to 2 1/2 in. 2.30c.	
2-15/16 to 6 in. 2.95c.	

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE

TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.65c.
No. 10, f.o.b. Chicago mill	1.75c.
No. 10, del'd Philadelphia	1.96c.
No. 10, f.o.b. Birmingham	1.80c.
No. 10, c.I.F. Pacific Coast ports	2.27 1/2c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.25c.
No. 24, f.o.b. Chicago mills	2.35c.
No. 24, del'd Philadelphia	2.50c.
No. 24, f.o.b. Birmingham	2.40c.
No. 24, c.I.F. Pacific Coast ports	2.90c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitt'sh	1.95c.
No. 19 gage, f.o.b. Chicago mills	2.05c.
No. 10 gage, del'd Phila.	2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitt'sh	2.40c.
No. 20 gage, f.o.b. Chicago mills	2.50c.
No. 20 gage, del'd Phila.	2.50c.
No. 20 gage, del'd Pacific Coast ports	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.15c.
No. 20, f.o.b. Pittsburgh	2.60c.
No. 20, f.o.b. Chicago	2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	3.00c.
No. 24, c.I.F. Pacific Coast ports	3.50c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terme

No. 24, unassorted, 8-lb. coating	
f.o.b. Pittsburgh	2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.
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Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.50c.
No. 28, Chicago mill	2.60c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	\$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)	
(Per Package, 20 x 28 in.)	
8 lb. coating I.C.	\$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.60c. to 1.65c.
All widths up to 24 in., Chicago	1.70c. to 1.75c.
Cooperage stock, P'gh	1.60c. to 1.65c.
Cooperage stock, Chicago	1.70c. to 1.75c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.00c. to 2.25c.
F.o.b. Cleveland	2.00c.
Del'd Chicago	2.30c. to 2.55c.
F.o.b. Worcester	2.15c. to 2.45c.
Fender stock, No. 20 gage, Pittsburgh	
Cleveland	2.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
Extras of 10c. a 100 lb. on mixed and joint carloads. 20c. on pool carloads and 30c. or less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

	Per Lb.
Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	\$1.85 to \$2.10
Smooth coated nails	1.85 to 2.10
Galvanized nails	3.35 to 3.60
	Base per 100 Lb.
Smooth annealed wire	\$2.25 to \$2.50
Smooth galvanized wire	2.60 to 2.85
Polished staples	2.55 to 2.80
Galvanized staples	2.80 to 3.05
Barbed wire, galvanized	2.35 to 2.60

Woven wire fence No. 9 gage, base column, per net ton \$30.00 to \$55.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago and Anderson prices are \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel	Black Galv.	Wrought Iron
Inches	Inches	Inches
1/4 to 3/4	1/4 to 3/4	1/4 to 3/4
1/2 to 3/4	1/2 to 3/4	1/2 to 3/4
3/4 to 1	3/4 to 1	3/4 to 1
1 to 3	1 to 3	1 to 3

Lap Weld

2 to 3	63 1/2	54 1/2
3 1/2 to 4	68 1/2	59 1/2
4 to 6	68 1/2	59 1/2
7 and 8	57 1/2	57
9 and 10	67	57
11 and 12	66	56

Butt Weld, extra strong, plain ends
1/4 to 3/4 48 1/2 33 1/2 1/4 to 3/4 48 1/2 33 1/2
1/2 to 3/4 54 1/2 41 1/2 1/2 to 3/4 54 1/2 41 1/2
3/4 to 1 60 51 1/2 to 3/4 60 51 1/2
1 to 3 64 1/2 55 1/2 1 to 3 64 1/2 55 1/2

Lap Weld, extra strong, plain ends
2 to 3 61 1/2 53 1/2 2 to 3 61 1/2 53 1/2
3 1/2 to 4 65 1/2 57 1/2 3 1/2 to 4 65 1/2 57 1/2
4 to 6 69 61 4 to 6 69 61
7 and 8 68 58 7 and 8 68 58
9 and 10 67 57 9 and 10 67 57
11 and 12 66 56 11 and 12 66 56

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2 1/2 points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Steel	Charcoal Iron
2 in. and 2 1/2	1 1/2 in. and 1 3/4
3 in. and 3 1/2	2 in. and 2 1/2
4 in. and 4 1/2	3 in. and 3 1/2
5 in. and 5 1/2	4 in. and 4 1/2
6 in. and 6 1/2	5 in. and 5 1/2
7 in. and 7 1/2	6 in. and 6 1/2
8 in. and 8 1/2	7 in. and 7 1/2
9 in. and 9 1/2	8 in. and 8 1/2
10 in. and 10 1/2	9 in. and 9 1/2
11 in. and 11 1/2	10 in. and 10 1/2
12 in. and 12 1/2	11 in. and 11 1/2

On lots of a carload or more, the above base discounts are subject to a preferential of two per cent on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn	Hot Rolled
1 in. 61	3 in. 46
1 1/4 to 1 1/2 in. 53	3 1/4 to 3 1/2 in. 48
1 1/2 in. 57	4 in. 51
2 to 2 1/4 in. 42	4 1/2 in. 40
2 1/2 to 3 in. 40	

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb. base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads) 55
Carbon, 0.30% to 0.40% base 50
Plus differential for lengths over 18 ft. and for commercial exact lengths. Ware-
house discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	\$40.00
Light (from billets), f.o.b. mill	30.00
Light (from rail steel), f.o.b. mill	26.00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	\$2.10
Spikes, 1/2 in. and smaller	2.55
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)	
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.P.C. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh	72 1/2, 25 and 10
Stove bolts in packages, Chgo.	72 1/2, 25 and 10
Stove bolts in packages, Cleveland	72 1/2, 25 and 10
Stove bolts in bulk, P'gh	73
Stove bolts in bulk, Chgo.	85
Stove bolts in bulk, Cleveland	85
Tire bolts	80
Discounts of 75 per cent off on bolts and nuts applied on carload business with jobbers and large consumers.	

Large Rivets

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	\$2.50
F.o.b. Chicago	2.60

Small Rivets

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chgo. and Birm'g'm	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)	
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread 1/4 in. and smaller	75 and 10
Unset hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Unset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Re-rolling, 4-in. to 6-in. inclusive Pittsburgh	\$26.00
Re-rolling, 4-in. to 6-in. inclusive Youngstown	26.00
Re-rolling, 4-in. to 6-in. inclusive Cleveland	26.00
Re-rolling, 4-in. to 6-in. inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

	Per Gross Ton
(Open-Hearth or Bessemer)	
Pittsburgh	\$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

	Per Gross Ton
(3 in. x 2 in. and under 10 in. x 10 in.)	
Pittsburgh	\$26.00
Youngstown	26.00
Cleveland	26.00

Skelp	
(F.o.b. Pittsburgh or Youngstown)	
Ground	1.40c.
Universal	1.40c.
Sheared	1.40c.

Wire Rods	
(Common soft, base)	
	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	\$35.00
Chicago	\$36.00

COKE, COAL AND FUEL OIL

Coke	
	Per Net Ton
Purnace, f.o.b. Connellsville	\$2.00 to \$2.25
Foundry, f.o.b. Connellsville	2.75 to 4.00
Foundry, by-product, Chicago areas, for delivery outside switching districts	7.50
Foundry, by-product, delivered in Chicago switching district	8.25
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	2.50
Foundry, by-product, Cleveland, delivered	8.26
Foundry, Birmingham	8.00
Foundry, by-product, St. Louis, f.o.b. areas	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal	
	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	\$1.10 to \$1.30
Mine run coking coal f.o.b. W. Pa.	1.40 to 1.50
Gas coal, %-in., f.o.b. Pa. mines	1.80 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.45 to 0.55
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil	
	Per Gal. f.o.b. Bayonne, N. J.
No. 2 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. f.o.b. Baltimore	
No. 2 distillate	4.00c.
No. 4 industrial	3.50c.
Per Gal. del'd Chicago	
No. 2 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.
Per Gal. f.o.b. Cleveland	
No. 2 distillate	4.00c.
No. 4 industrial	3.75c.

REFRACTORIES

Fire Clay Brick	
	Per 1000 f.o.b. Works
High-heat Intermediate Duty Brick	
Pennsylvania	\$40.00
Maryland	40.00
New Jersey	50.00
Ohio	40.00
Kentucky	40.00
Missouri	40.00
Illinois	40.00
Ground fire clay, per ton	7.00

Chrome Brick

	Per Net Ton
Standard size	\$42.50 to \$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	\$40.00
Chicago	40.00
Birmingham	50.00
Silica clay, per ton	6.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	\$45.00
Unburned, f.o.b. Baltimore and Chester, Pa.	\$3.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	\$2.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	\$43.40 to \$44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	\$2.00
4-in., del'd New York	41.00
4-in., and larger, Birmingham	\$35.00 to \$36.00
4-in., Birmingham	\$38.00 to \$39.00
Class "A" and gas pipe, \$3 extra.	

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton f.o.b. Valley furnace:	
Basic	\$15.00
Bessemer	16.00
Gray forge	15.50
No. 2 foundry	15.50
No. 3 foundry	15.00
Malleable	15.00
Low phos., copper free	24.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.50
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.50

Freight rates to points in Pittsburgh district range from 60c. to \$1.26.

CHICAGO

Per gross ton at Chicago furnaces:	
N'th'n No. 2 fdy.	\$16.00
N'th'n No. 1 fdy.	16.50
Malleable, not over 2.25 sil.	16.00
High phosphorus	16.00
Lake Superior charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	\$16.14 to 17.14
Low phos., sil. 1 to 2, Copper free	25.00
Silvery, sil. 8 per cent.	24.92
Bess. ferrotilin, 15 per cent.	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:	
No. 2 fdy., sil. 1.75 to 2.25, f.o.b.	\$16.00
Granite City, Ill.	16.85
Del'd St. Louis	16.85
Malleable, f.o.b. Granite City	16.50
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	16.35

Freight rates, \$3c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:	
*Buffalo, No. 2, del'd Eastern	\$17.41
*Buffalo, malleable, del'd Eastern	17.91
*N. J., No. 2 fdy.	17.02
*East Pa. No. 2 fdy.	17.52

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	14.00
Lake Superior charcoal, del'd	23.41

CINCINNATI

Per gross ton, delivered Cincinnati:	
Ala. fdy., sil. 1.75 to 2.25	\$16.51
Tenn. fdy., sil. 2.25 to 2.75	16.74
N'th'n No. 1 fdy.	16.51
N'th'n No. 2 foundry	\$17.01 to 18.19
S'th'n No. 1 silvery	21.59

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy.	\$15.50
Malleable	15.50
Ohio silvery, 8 per cent.	23.00
Stand. low phos., Valley	23.00
Southern No. 2 fdy.	16.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 65c. average local switching charge; \$5.40 from Jackson, Ohio; \$6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:	
East. Pa. No. 2	\$16.31
East. Pa. No. 2X	16.84
East. Pa. No. 1X	17.34
Basic (del'd east Pa.)	16.00
Malleable	16.84
Stand. low phos. (f.o.b. east. Pa. furnace)	\$23.00 to \$23.00
Cop. b'r's low phos. (f.o.b. furnace)	22.00 to 23.00
Ys. No. 1	21.79
Ys. No. 2X	22.29

Prices, except as specified otherwise, are del'd Philadelphia. Freight rates: \$4c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:	
No. 2 fdy., 1.75 to 2.25 sil.	\$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.50
Basic	12.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:	
Buffalo, sil. 1.75 to 2.25	\$18.53 to \$19.04
Buffalo, sil. 2.25 to 2.75	18.53 to 19.04
Ala., sil. 1.75 to 2.25	18.00 to 18.50

CANADA

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$22.40
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.30
Malleable	24.00
Basic	\$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard, (carloads)	\$82.00
Domestic, 80%, seaboard, (less carloads)	89.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$27.00

Electric Ferrosilicon

Per Gross Ton Delivered	
50% (carloads)	\$74.50
50% (less carloads)	83.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Silvery Iron

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace	
	Per Gross Ton
6%	\$19.00
7%	19.50
8%	20.00
9%	20.50
10%	21.00
11%	21.50
	Per Gross Ton
12%	\$22.00
13%	22.50
14%	23.00
15%	23.50
16%	24.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, or Pittsburgh Furnace	
	Per Gross Ton
10%	\$21.50
11%	22.00
12%	22.50
13%	23.00
	Per Gross Ton
14%	\$23.50
15%	24.00
16%	24.50

Manganese 1 1/2 to 3%, \$1 a ton additional.
Phosphorus 0.65% or over, \$1 a ton additional.

Other Ferroalloys

Ferrotungsten, per lb. wo. del. carloads	94c.
Ferrotungsten, less carloads	\$1.00
Ferrocobaltum, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered in carloads	9.50c.

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.50 to 11.00
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Balls 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.00 to 12.50
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	8.50 to 9.00
Short shov. steel turnings	8.50 to 9.00
Short mixed borings and turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	9.00 to 9.50
No. 1 cast	10.00 to 11.00
Railr. knuckles and couplers	13.00 to 14.00
Railr. coil and leaf springs	13.00 to 14.00
Roller steel wheels	15.00 to 16.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	15.00 to 15.50

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$9.75 to \$10.00
Shoveling steel	9.75 to 10.00

Ferrocobaltum, 2% carbon	16.50c. to 17.00c.
Ferrocobaltum, 1% carbon	17.50c. to 18.00c.
Ferrocobaltum, 0.10% carbon	19.50c. to 20.00c.
Ferrocobaltum, 0.06% carbon	20.00c. to 20.50c.
Ferrocobaltum, del. per lb. contained Cr.	\$2.00 to 2.50
Ferrocobaltum, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrocobaltum, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with 33 unitage	50.00
Ferrocobaltum, electric, 34% f.o.b. Anniston, Ala., per gross ton with 32.75 unitage	65.00
Ferrocobaltum, per lb. Me., del.	95c.
Calcium molybdate, per lb. Me., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lot	\$36.00
Too lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	\$5.00
2% carbon grade	\$4.00
1% carbon grade	\$3.00
Spot prices	\$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports	
	Per Gross Ton
Old range Bessemer, 51.5% iron	\$4.00
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ores, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	7.50c.
Iron, low phos., Swedish, average 68 1/4% iron	8c.
Iron, basic or foundry, Swedish, average, 65% iron	7.50c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	7.50c.
Manganese, Caucasian, washed 53% Mn	15c.
Manganese, African, Indian, 50-52%	18c.
Manganese, Brazilian, 46 to 48%	16c.
Per Net Ton Unit	
Tungsten, Chinese wolframite, duty paid	\$10.00
Per Gross Ton	
Tungsten, domestic scheelite	\$8.00 to \$10.00
Chrome, 45%, Cr2O3, crude, c.i.f. Atlantic seaboard	14.00
Chrome, 48%, Cr2O3, c.i.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	\$10.50 to \$11.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	13.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium, fluoride, not over 2 1/4% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Hydraulic comp. sheets	\$8.00 to \$8.50
Drop forge flashings	6.75 to 7.25
No. 1 busheling	8.00 to 8.50
Roller carwheels	10.00 to 10.50
Railroad tires	10.00 to 10.50
Railroad leaf springs	10.00 to 10.50
Axle turnings	7.75 to 8.25
Steel couplers and knuckles	10.00 to 10.50
Coil springs	10.50 to 11.00
Axle turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	10.00 to 10.50
Low phos. plates, 12 in. and under	10.00 to 10.50
Cast iron borings	6.00 to 6.50
Short shoveling turnings	6.00 to 6.50
Machine shop turnings	10.25 to 10.75
Rolling mill turnings	10.50 to 11.00
Steel rails, less than 3 ft.	10.50 to 11.00
Steel rails, less than 2 ft.	11.00 to 11.50
Angle bars, steel	10.50 to 11.00
Cast iron carwheels	9.50 to 10.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	8.00 to 8.50

Per Net Ton

Iron car axles	\$12.00 to \$13.00
Steel car axles	11.25 to 11.75
No. 1 railroad wrought	8.00 to 8.50
No. 2 railroad wrought	8.50 to 9.00

No. 3 bushing	\$4.00 to \$4.50
Locomotive tire, smooth	7.50 to 8.50
Pipe and flues	4.75 to 5.25
No. 1 machinery cast	8.75 to 9.25
Clean automobile cast	8.75 to 9.25
No. 1 railroad cast	8.50 to 9.00
No. 1 agricultural cast	8.00 to 8.50
Stove plate	7.00 to 7.50
Grate bars	6.75 to 7.25
Brake shoes	8.00 to 8.50

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.00
No. 2 heavy melting steel	9.00
No. 1 railroad wrought	11.00
Bundled sheets	\$4.00 to 4.50
Hydraulic compressed, new	8.00
Hydraulic compressed, old	8.00
Machine shop turnings	6.50 to 7.00
Heavy axle turnings	7.50 to 8.00
Cast borings	7.00
Heavy breakable cast	9.00
Stove plate (steel works)	8.00
No. 1 iron phos, heavy	12.00 to 13.00
Couplers and knuckles	10.50 to 11.00
Roller steel wheels	10.50 to 11.00
No. 1 blast furnace	7.00
Spec. iron and steel pipe	8.00 to 8.50
Shafting	13.00 to 13.50
Steel Axles	13.00 to 13.50
No. 1 force fire	8.50 to 9.00
Cast iron car wheels	12.00 to 12.50
No. 1 cast	10.00 to 10.50
Cast borings (chem.)	10.00 to 10.50
Steel rails for rolling	10.00 to 11.00

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.50 to \$19.00
No. 2 heavy melting steel	9.25 to 9.50
Compressed sheet steel	9.00 to 9.50
Lath bundled sheet stamp- ing	6.5 to 7.00
Drop forge flashings	8.00 to 8.50
Machine shop turnings	6.75 to 7.00
Short shoring turnings	7.00 to 7.50
No. 1 bushing	7.50 to 8.00
Steel axle turnings	7.50 to 8.00
Low phos. billet crops	12.00 to 12.50
Cast iron borings	7.25 to 7.50
Mixed borings and short turnings	7.25 to 7.50
No. 2 bushing	7.00 to 7.25
No. 1 cast	10.00 to 10.50
Railroad grate bars	5.50 to 6.00
Stove plate	8.50 to 9.00
Rails under 2 ft.	8.50 to 9.00
Rails for rolling	10.00 to 10.50
Railroad malleable	10.00 to 10.50
Cast iron car wheels	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' yards:	
No. 1 heavy melting steel	\$10.00
No. 2 heavy melting scrap	\$8.75 to 9.25
Scrap rails	8.75 to 9.25
New hydraulic, comp. sheets	8.75 to 9.25
Old hydraulic, comp. sheets	7.50 to 8.00
Drop forge flashings	8.75 to 9.25
No. 1 bushing	8.75 to 9.25
Hy. steel axle turnings	7.50 to 8.00
Machine shop turnings	4.25 to 4.50
Knuckles and couplers	11.00 to 11.50
Coil and leaf springs	11.00 to 11.50
Roller steel wheels	11.00 to 11.50
Low phos. billet crops	12.00 to 12.50
Short shor. steel turnings	6.50 to 7.00
Short mixed borings and turnings	6.25 to 6.75
Cast iron borings	6.00 to 6.50
No. 2 bushing	6.00 to 6.50
Steel car axles	11.00 to 12.00
Iron axles	11.00 to 12.00
No. 1 machinery cast	12.50 to 13.00
No. 1 cupola cast	10.00 to 10.50
Stove plate	8.00 to 8.50
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron car wheels	9.00 to 9.50
Industrial malleable	11.50 to 12.00
Railroad malleable	11.50 to 12.00
Chemical borings	7.50 to 8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.50 to \$10.00
Scrap steel rails	9.00 to 9.50
Short shoring turnings	1.50 to 5.00
Stove plate	8.50 to 9.00
Steel axles	11.00 to 11.50
Iron axles	11.00
No. 1 railroad wrought	7.00 to 7.50
Rails for rolling	10.50
No. 1 cast	10.00
Tramcar wheels	10.00
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.00 to \$8.50
No. 1 heavy melting	8.00 to 8.50
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tire	6.00 to 6.50
Misc. stand-sec. rails	9.00 to 9.50
Railroad springs	4.50 to 5.00
Bundled sheets	4.50 to 5.00
No. 3 railroad wrought	8.00 to 8.50
No. 1 bushing	3.50 to 4.00
Cast iron borings and shoring turnings	3.00 to 3.50
Rails for rolling	9.50 to 10.00
Machine shop turnings	3.00 to 3.50
Heavy turnings	4.00 to 4.50
Steel car axles	9.50 to 10.00
Iron car axles	11.00 to 11.50
Wrought iron bars and trans.	8.00 to 8.50
No. 1 railroad wrought	6.50 to 7.00
Steel rails less than 3 ft.	10.00 to 10.50
Steel angle bars	9.00 to 9.50
Cast iron car wheels	8.00 to 8.50
No. 1 machinery cast	8.00 to 8.50
Railroad malleable	8.00 to 8.50
No. 1 railroad cast	8.00 to 8.50
Stove plate	7.00 to 7.50
Heavy rails, 60 lb. and under	10.00 to 10.50

Malar. rails, 60 lb. and over	\$20.00 to \$21.00
Agricult. malleable	6.00 to 6.50

BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$5.75 to \$6.10
Scrap T rails	5.75 to 6.00
Machine shop turnings	2.75 to 3.00
Cast iron borings	2.00 to 2.25
Bundled skeleton long	4.00 to 4.25
Forge flashings	4.00 to 4.25
Blast furnace scrap	2.50 to 2.75
Shafting	8.50 to 9.00
Wrought pipe	2.25 to 2.50
Rails for rolling	6.00 to 6.50
Cast iron borings, chemical	7.25 to 7.75
Per gross ton delivered consumers' yards:	
Textile cast	\$8.00 to \$8.50
No. 1 machinery cast	7.50 to 8.00
Stove plate	4.25 to 4.50
Railroad malleable	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$4.50 to \$7.50
No. 2 heavy melting steel	4.25 to 6.25
Heavy melting steel (yard)	3.50 to 3.80
No. 1 heavy breakable cast	6.00 to 6.50
Stove plate (steel works)	4.00 to 4.50
Machine shop turnings	3.00
Short shoring turnings	2.50 to 3.00
Cast borings	2.50 to 3.00
No. 1 blast furnace	3.00 to 3.50
Steel car axles	9.50 to 10.00

PITTSBURGH

Base per lb.	
Plates	3.85c
Structural shapes	3.85c
Soft steel bars and small shapes	3.60c
Reinforcing steel bars	3.60c
Cold-finished and screw stock	
Rounds and hexagons	3.85c
Squares and flats	3.95c
Hoops and bands, under 1/4 in.	3.95c
Hot-rolled annealed sheets (No. 24)	3.10c
25 or more bundles	3.10c
Galv. sheets (No. 24), 36 or more bundles	3.60c
Hot-rolled sheets (No. 10) 1.60c to 2.90c	
Galv. corrug. sheets (No. 28), per square (less than 2750 lb.)	\$3.61
Spikes, large	2.40c
Small	2.50c
Boat	2.90c
Track bolts, all sizes, per 100 count	
70 per cent off list	
Machine bolts, 100 count	
70 per cent off list	
Carriage bolts, 100 count	
70 per cent off list	
Nuts, all styles, 100 count	
70 per cent off list	
Large rivets, base per 100 lb.	\$3.00
Wire, black, soft and hard, base per 100 lb.	3.45
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per kg.	2.20

On plates, structurals, bars, reinforcing
bars, bands, hoops and blue annealed
sheets, base applied to orders of 400 to
999 lb.

CHICAGO

Base per lb.	
Plates and structural shapes	3.00c
Soft steel bars	2.75c
Reinforc. bars, billet steel	1.75c to 1.90c
Half steel reinforcement	1.50c to 1.65c
Cold-fn. steel bars and shafting	
Rounds and hexagons	3.00c
Plats and squares	3.50c
Bands, 3/16 in. (in Nos. 10 and 12 sizes)	2.95c
Hoops (No. 14 galv. and lighter)	3.50c
Hot-rolled annealed sheets (No. 24)	3.45c
Galv. sheets (No. 24)	3.85c
Hot-rolled sheets (No. 10)	2.75c
Spikes (1/16 in. and lighter)	3.45c
Track bolts	4.90c
Rivets, structural (leg lots)	2.75c
Rivets, boiler (leg lots)	2.75c
Machine bolts	Per Cent Off List
Carriage bolts	65
Coupler and lag screws	65
Hot-pressed nuts, sq., tap. or blank	85
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotter pins	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	\$4.50 off list
No. 8 black ann'd riv. per 100 lb.	\$3.45
Com. wire nails, base per keg	2.20
Cement c'd'd nails, base per keg	2.50

NEW YORK

	Base per lb.
Plates and struc. shapes	3.10c
Soft steel bars, small shapes	3.10c
Iron bars	3.24c
Iron bars, swed. charcoal	5.75c to 6.25c
Cold-fn. shafting and screw stock	
Rounds and hexagons	3.54c
Plats and squares	4.04c
Cold-roll. strip, soft and quarter hard	4.95c
Hoops	3.30c
Bands	2.35c
Hot-rolled sheets (No. 10)	2.65c
Hot-rolled ann'd sheets (No. 24 ^a)	3.25c
Galvanized sheets (No. 24 ^a)	3.50c
Long term sheets (No. 24 ^a)	4.50c
Standard tool steel	12.00c
Wire, black annealed (No. 10)	2.90c
Wire, galv. annealed (No. 10)	4.05c
Tire steel 1/4 x 1/4 in. and larger, Smooth finish, 1 to 2 1/4 x 1/4 in.	3.75c

Spec. iron and steel pipe	\$3.50
5-pc. fire	4.35
No. 1 railroad wrought	\$5.00 to 5.50
No. 1 yard wrought long	3.80 to 3.75
Rails for rolling	6.25 to 6.75
No. 1 cast	6.00 to 6.50
No. 2 cast	5.50 to 6.00
Stove plate (foundry)	5.50
Cast borings (chemical)	6.00 to 6.50
Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$9.00
No. 1 hy. cast (cupola size)	7.50 to 8.00
No. 2 cast	6.00 to 5.50

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.75 to \$8.25
Scrap rails for melting	3.50 to 9.00
Loose sheet clippings	3.00 to 3.50
Bundled sheets	4.50 to 5.00
Cast iron borings	4.25 to 4.75
Machine shop turnings	3.75 to 4.25
No. 1 bushing	5.25 to 5.75
No. 2 bushing	2.75 to 3.25
Rails for rolling	8.50 to 9.00
No. 1 locomotive tiers	7.50 to 8.00
Short rails	10.50 to 11.00
Cast iron car wheels	7.25 to 7.75
No. 1 machinery cast	7.75 to 8.25
No. 1 railroad cast	7.25 to 7.75
Burnt cast	5.25 to 5.75
Stove plate	5.25 to 5.75
Agricultural malleable	7.75 to 8.25
Railroad malleable	8.00 to 8.50

Open hearth spring steel, bases	4.50c to 7.00c
Common wire nails, base, per kg	\$2.65
Machine bolt, cut thread:	Per Cent Off List
1/4 x 10 in. and smaller	65 to 65 and 10
1/2 x 10 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
1/4 x 6 in. and smaller	65 to 65 and 10
1/2 x 6 in. and smaller	65 to 65 and 10
Boiler tubes:	
Lap welded, 3-in.	\$18.95
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	28.65
*No. 28 and lighter, 36 in. wide, 20c higher per 100 lb.	

ST. LOUIS

Base per lb.	
Plates and struc. shapes	3.25c
Bars, soft steel or iron	3.00c
Cold-fn. rounds, shafting, screw stock	3.35c
Hot-rolled annealed sheets (No. 24)	3.60c
Galv. sheets (No. 24)	4.00c
Hot-rolled sheets (No. 10)	3.00c
Black corrug. sheets (No. 24)	3.65c
Galv. corrug. sheets	4.05c
Structural rivets	3.00c
Boiler rivets	3.00c
Per Cent Off List	
Tank rivets, 7/16 in. and smaller, 100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 300 lb. or more	65
Less than 300 lb.	65
Hot-pressed nuts, hex., blank or tapped, 300 lb. or more	65
Less than 300 lb.	65

PHILADELPHIA

Base per lb.	
*Plates, 1/4-in. and heavier	2.45c
*Structural shapes	2.45c
*Soft steel bars, small shapes, from bars (except bands)	2.45c
Reinforc. steel bars, sq., twisted and deform.	2.35c
Cold-finished steel bars	2.35c
*Steel hoops	3.00c
*Steel bands, No. 12 to 3/16 in., incl.	2.75c
Spring steel	3.00c
*Hot-rolled annealed sheets (No. 24)	3.15c
*Galvanized sheets (No. 24)	3.50c
*Hot-rolled annealed sheets (No. 10)	2.70c
Diam. pat. floor plates, 1/4 in.	5.00c
Swedish iron bars	5.60c

These prices are subject to quantity
differentials except on reinforcing and Swed-
ish iron bars.
*Base prices subject to deductions on
orders aggregating 4000 lb. or over.
†For 50 bundles or over.

CLEVELAND

Base per lb.	
Plates and struc. shapes	2.95c
Soft steel bars	2.75c
Reinforc. steel bars	1.75c to 2.35c
Cold-fn. steel bars	2.95c
Flat rolled steel under 1/4 in.	2.90c
Cold-finished strip	3.45c
Hot-rolled annealed sheets (No. 24)	3.50c
Galvanized sheets (No. 24)	3.90c
Hot-rolled sheets (No. 10)	3.00c
Black ann'd wire, per 100 lb.	\$2.55
No. 8 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10
*Net base, including boxing and cutting to length	
Base per lb.	
Plates and struc. shapes	2.95c
Bars, soft steel or iron	2.90c
New billet reinforce. bars	2.90c
Rail steel reinforce. bars	2.90c
Hoops	2.90c
Bands	2.90c
Cold-fn. rounds and hex.	3.25c

CINCINNATI

Base per lb.	
Plates and struc. shapes	2.95c
Bars, soft steel or iron	2.90c
New billet reinforce. bars	2.90c
Rail steel reinforce. bars	2.90c
Hoops	2.90c
Bands	2.90c
Cold-fn. rounds and hex.	3.25c

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$7.75 to \$8.25
Borings and short turnings	5.75 to 6.25
Long turnings	4.75 to 5.25
No. 1 machinery cast	8.00 to 8.50
Automotive cast	10.00 to 10.50
Hydraulic comp. sheets	7.75 to 8.25
Stove plate	4.50 to 5.00
New No. 1 bushing	6.75 to 7.25
Old No. 2 bushing	4.75 to 5.25
Sheet clippings	5.00 to 5.50
Flashings	5.75 to 6.25

CANADA

Dealers' buying prices per gross ton:	
	Toronto Montreal
Heavy melting steel	\$4.50 \$4.50
Rails, scrap	4.50 4.50
Machine shop turnings	2.00 2.00
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	2.00 2.00
Steel borings	2.00 2.00
Wrought pipe	3.50 3.50
Steel axles	4.50 4.50
Axles, wrought iron	4.50 4.50
No. 1 machinery cast	7.75 8.00
Stove plate	4.50 5.00
Standard carwheels	7.25 7.00
Malleable	6.75 7.00

PLANT EXPANSION AND EQUIPMENT BUYING

◀ NEW ENGLAND ▶

Hodgman Rubber Co., Inc., Herbert Street, Framingham, Mass., has let general contract to Julius J. Conviser, 333 Washington Street, Boston, for two two-story and basement additions, 100 x 100 ft. and 60 x 60 ft., respectively. Cost over \$65,000 with equipment.

Croft Brewing Co., Roxbury Crossing, Boston, operating former brewing plant of Highland Spring Brewery, has concluded financing totaling about \$600,000, to be used in part for extensions and improvements, including one-story and basement addition, 60 x 125 ft. Plant will be developed for output of 240,000 bbl. a year and is scheduled for completion in October. John F. Hunt & Co., 545 West Twentieth Street, New York, are architects and engineers.

John C. Dunn & Son, Inc., Providence, R. I., has been organized by John F. Dunn, 24 Vaughn Street, and associates, to manufacture bottling machinery and equipment.

Salem Oil & Grease Co., 60 Grove Street, Salem, Mass., let general contract to Pitman & Brown Co., 11 Washington Street, for addition for processing, storage and distribution. Cost close to \$60,000 with equipment. Smith & Walker, 80 Boylston Street, Boston, are architects.

Haffenreffer & Co., 80 Bismarck Street, Jamaica Plain, Boston, brewers, will carry out expansion and improvements in plant at Roxbury, Mass., recently acquired. Addition will be built. Cost over \$100,000 with equipment. Cleverdon, Varney & Pike, 46 Cornhill Street, Boston, are engineers.

◀ NORTH ATLANTIC ▶

Brooklyn Bottling & Distributing Co., Inc., DeKalb Avenue and Lewis Street, Brooklyn, has filed plans for new five-story brewing plant, 81 x 200 ft. Cost about \$300,000 with equipment; also for alterations and improvements in present four-story brewery. Cost \$50,000 with equipment. Koch & Wagner, 32 Court Street, are architects.

Southern Alkali Corp., an interest of American Cyanamid Co., 535 Fifth Avenue, New York, and Pittsburgh Plate Glass Co., Pittsburgh, organized number of months ago, has engaged H. K. Ferguson Co., Hanna Building, Cleveland, engineer and contractor, to supervise plans and erection of plant on 350-acre tract at Corpus Christi, Tex., work to begin early this month. Project will include machine shop and power house. Cost over \$5,000,000 with machinery. Hugh Galt, an official of Columbia Chemical Co., Barberton, Ohio, an interest of Pittsburgh Plate Glass Co., is president of Southern company.

National Distillers Products Corp., 52 William Street, New York, is arranging with United States Industrial Alcohol Co., 60 East Forty-second Street, for organization of joint subsidiary to erect, acquire and operate distilling plants for manufacture and blending of liquors when legalized. First noted company has concluded plans for purchase of properties of Overholt Distributing Co., at Broad Ford and Large, Pa., and Louisville, and will carry out expansion and improvements, including new equipment.

Maritime Electric Welding Co., Inc., Brooklyn, has been organized by Ralph Scott, 316 Eighty-eighth Street, and associates, to operate a general welding works.

Continental Can Co., Inc., 100 East Forty-second Street, New York, is considering erection of second story addition to one-story plant, 140 x 160 ft., at Houston, Tex. Cost close to \$50,000 with equipment. Work is being completed on initial one-story unit, for which general contract was recently let to J. B. Townsend, Post-Dispatch Building, Houston.

Tri-Square Metal Products, Inc., New York, has been organized by Adolf Illi, 1319 Newkirk Avenue, and Kurt Grenier, 249 St. Nicholas Avenue, both Brooklyn, to manufacture metal goods.

Anaconda Copper Mining Co., 25 Broadway, New York, plans extensions and improvements in zinc mining property of Butte Copper & Zinc Co., Butte, Mont., operated under long-term lease, and will install new mining machinery, handling and other equipment.

General Cable Corp., 420 Lexington Avenue, New York, manufacturer of copper and aluminum cables, wire, etc., plans new branch works

at Los Angeles, where site is being acquired. Cost over \$200,000 with equipment. Company recently secured order for copper cable from Bureau of Water and Power, Los Angeles, for transmission line from city to hydroelectric power project of Government at Boulder Canyon, Nev., totaling \$2,399,000, and will use new plant for this production.

Wetling-Henry-Dale Castings Corp., Ridge-wood, N. J., has been organized under direction of Lewis R. Conklin, Realty Building, capital \$100,000, to manufacture iron, steel and other metal castings.

Sonoco Products Co., Inc., 709 West Front Street, Plainfield, N. J., manufacturer of paperboard, paper tubing and kindred products, with headquarters at Hartsville, S. C., has purchased building No. 3 at former plant of Aeolian Co., Garwood, N. J., totaling 100,000 sq. ft. floor space, and will improve for new plant. Plainfield works will be removed to new location.

Department of Public Affairs, City Hall, Newark, Meyer C. Ellenstein, mayor, director, plans construction and completion of municipal electric railway project, including purchase of equipment, etc., for which financing in amount of \$2,850,000 has been arranged.

Utility Tubing Co., Irvington, N. J., has been organized by Louis I. Baunstein, 146 Coit Street, and associates, to manufacture armored and lead cables, and kindred specialties.

Binder Cooperage Co., Second and Oxford Streets, Philadelphia, manufacturer of wire-bound barrels, kegs, etc., has leased group of buildings on land bounded by Delaware and Susquehanna Avenues, Beach and Dyott Streets, 105,000 sq. ft., for new plant.

Trainer Brewing Co., 1306 Fitzwater Street, Philadelphia, has let general contract to Francis A. Canuso & Son, 804 South Twelfth Street, for new one-story addition for storage and distribution. Cost about \$35,000 with equipment.

Esslingers, Inc., 417 North Tenth Street, Philadelphia, brewer, has purchased property at Tenth and Callowhill Streets for addition for storage and distribution. Cost over \$30,000 with equipment.

Fink Brewing Co., plant, Forster and Capital Streets, Harrisburg, Pa., has been acquired by new interests, headed by Alexander Jacobs, Wormleysburg, Pa., and associates. Plans are under way for extensions and improvements, including additional machinery. Cost about \$75,000 with equipment. Company will be organized to operate plant.

Summit Stoves, Inc., Geneva, N. Y., has been organized by Willard S. Kidney, 78 North Brook Street, and Earl C. Staley, Waterloo Road, capital \$200,000, to manufacture stoves and ranges, parts, etc.

Buffalo Pipe & Foundry Corp., 9 Austin Street, Buffalo, manufacturer of cast iron pipe, etc., is reopening foundry at Medina, N. Y., after shut-down for over a year.

New Jersey Gear & Mfg. Co., Newark, recently organized to succeed Meisselbach-Catucci Mfg. Co., has leased plant at 38 Stanton Street, Newark, for manufacture of gears, pinion rods, screw machine products, etc. A. Falla and A. Wallin, both formerly of Meisselbach-Catucci company, are president and vice-president, respectively.

◀ SOUTH ATLANTIC ▶

Cloverdale Brewing Co., 2000 Bolton Street, Baltimore, Pannill Martin, president, has engaged Albert Kahn, Inc., Detroit, architect and engineer, to draw plans for new works on 15-acre site recently purchased. Power house, machine shop and other mechanical structures will be included. Cost about \$300,000 with equipment.

Enterprise Mfg. Co., Pittsboro, N. C., plans rebuilding part of cottonseed oil mill and commercial fertilizer works recently destroyed by fire. Loss about \$50,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until July 13 for electrical transformers, line disconnecting switches, lightning arresters, insulators, etc. (Schedule 2881); until July 12, one Diesel engine unit, 5000 ft. copper cable, meter-testing blocks, 75,000 ft. rubber insulated wire, conduit bushes and other equipment (Schedule 2879).

Southern Breweries, Inc., 507 Commercial Bank Building, Charlotte, Coy E. Langford,

representative, recently organized, has let general contract to J. J. McLevitt Co., Builders' Building, for initial unit of new plant. Awards for other units will be made soon. Cost over \$125,000 with equipment. E. A. Mees, Mees & Mees, Court Arcade, is engineer.

Coca Cola Bottling Co., Atlanta, Ga., has plans for new two-story bottling plant at Thomasville, N. C. Cost over \$40,000 with equipment. J. J. Sawyer, Jefferson Building, Greensboro, N. C., is architect.

Board of Directors, Edgar Tufts Memorial Association, Banners Elk, N. C., plans new auxiliary steam power plant and waterworks pumping station at Lees-McRae College, including installation of 100 kw. engine-generator unit, 150 hp. steam boiler and complete accessories, deep-well turbine pumping machinery and auxiliary equipment. Work will be carried out in connection with new building and equipment program at institution. Cost over \$300,000. Edgar H. Tufts is president.

Division of Purchases and Sales, Department of Commerce, Washington, asks bids until July 13 for 25 inner and outer structures for 116-ft. steel triangulation towers, with 10 10-ft. extensions for tower units, complete with steps, bolts, etc. (Proposal 25452).

Carolina Brewing Co., Columbia, S. C., O. Lee Gordon, president, has acquired 10 acre tract near city limits for new plant, and is having plans drawn for brewhouse, bottling works, power house, machine shop and other units. Cost about \$300,000 with machinery. Company was recently organized.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 11 for six electric portable submersible pumps (Schedule 271) for Sewalls Point, Va., Navy Yard; 30,120 lb. copper nickel alloy cylinders (Schedule 363) for Washington yard; chrome nickel arc welding electrodes (Schedule 347), 600 storage battery testing outfits (Schedule 350) for Brooklyn yard; six motor-driven bench drills and spare parts (Schedule 287), six motor-driven combination wet and dry grinders (Schedule 286), 40 water gages and spare parts (Schedule 270) for Boston, Brooklyn, Philadelphia and Puget Sound yards; corrosion resisting steel plates, sheets and bars (Schedule 291) for Puget Sound yard.

◀ CENTRAL DISTRICT ▶

Pittsburgh Rolls Corp., Forty-first and Willow Streets, Pittsburgh, manufacturer of steel rolls, tube mill rolls, pinions, etc., an interest of Blaw-Knox Co., Blawnox, Pa., is considering erection of one-story addition. Application has been made to city for vacation of thoroughfare for site.

Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, let general contract to Rust Engineering Co., Pittsburgh, for one-story addition to plant at Huntington, W. Va., 160 x 320 ft., for storage and distribution. Cost about \$65,000 with equipment.

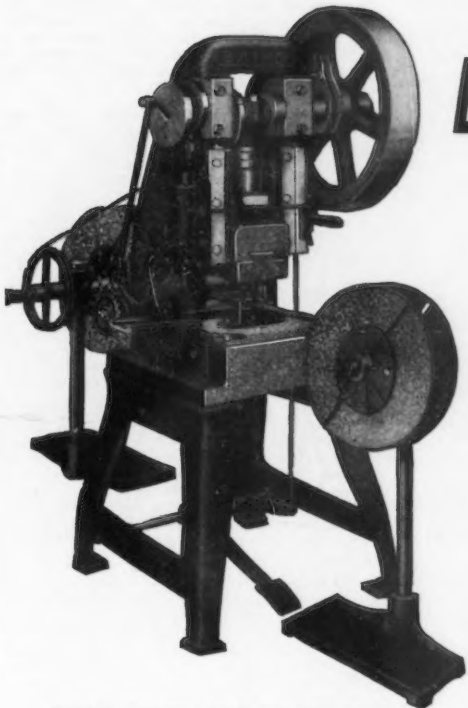
Department of Public Service, City Hall, Cleveland, asks bids on general contract until July 13 for municipal refuse and incinerator plant, 150 x 350 ft. Cost about \$700,000 with equipment. William J. Kennedy is service director.

Cleveland Railway Co., Midland Bank Building, Cleveland, will make extensions and improvements in car barns and shop at Cedar Avenue and East 170th Street. Cost about \$35,000 with equipment. T. H. Nichols is company engineer in charge.

City Council, Wapakoneta, Ohio, is considering erection of a municipal electric light and power plant. Cost about \$140,000 with equipment. Edward Strobel, chairman of building committee, in charge.

Sun Rise Brewing Co., Cleveland, has taken over former brewery of Gund Brewing Co., 1417 Davenport Avenue, and has let general contract to Lerman-Hecht Construction Co., Society for Savings Building, for extensions and improvements. Additional equipment will be installed. Cost over \$50,000 with machinery. Paul S. Schmidt, 4500 Euclid Avenue, is engineer.

Miami Valley Brewing Co., First and Beckel Streets, Dayton, Ohio, let general contract to Industrial Building Co., Reibold Building, for one-story and basement bottling unit, 37 x 100 ft., and improvements in present plant. Cost



BAIRD AUTOMATIC POWER PRESSES

Look Before You Build

Sometimes manufacturers try to design and build their own machines in the hope of saving some money. They have reported to Baird that they were "decidedly wrong" in so doing because, as it later turned out, they could have bought a better machine from Baird at less cost and without assuming the risk of obtaining satisfactory performance.

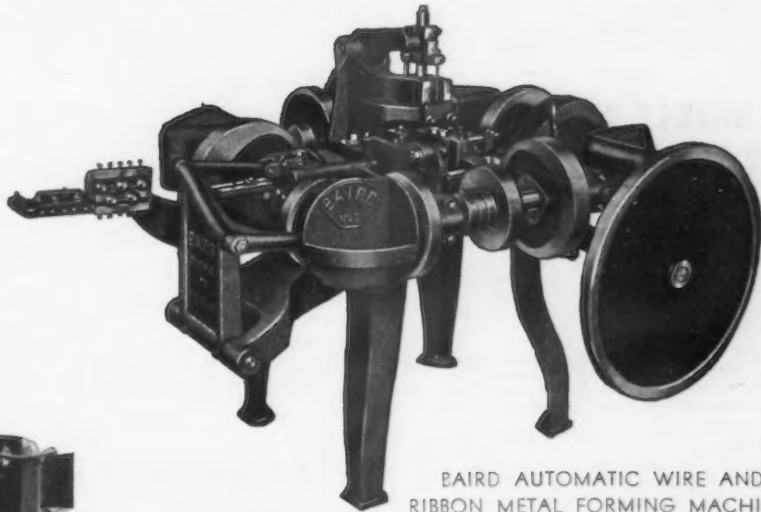
A manufacturer's experience doesn't qualify him to become a good builder of machines over night. Baird's experience goes back 60 years and it has been concentrated wholly on the problems of building production machines.

Four Baird machines are here illustrated, but we have developed many others having to do with the machining, grinding, stamping and forming of duplicate parts. If you really want to save money on your machine equipment—

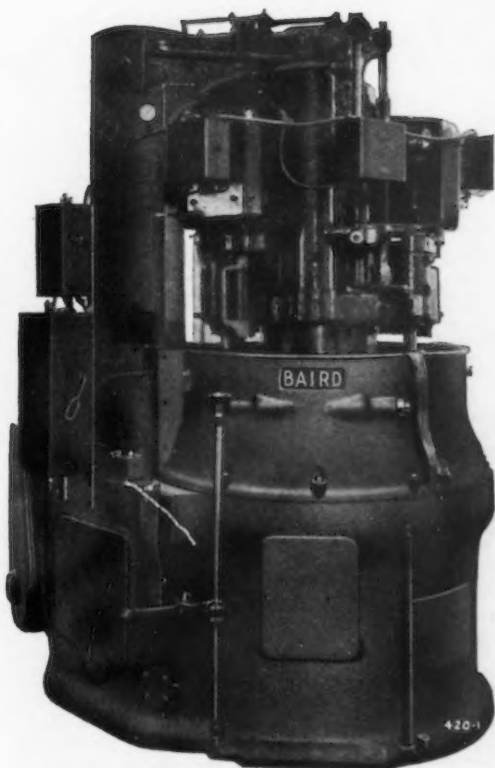
"ASK BAIRD ABOUT IT"

THE BAIRD MACHINE COMPANY

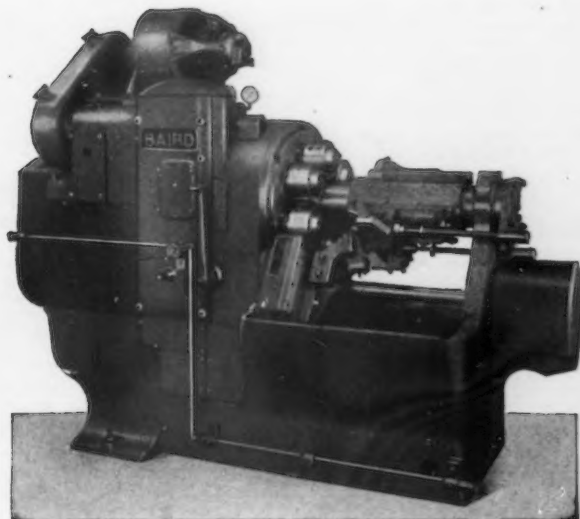
BRIDGEPORT, CONN.



BAIRD AUTOMATIC WIRE AND RIBBON METAL FORMING MACHINES



BAIRD AUTOMATIC MULTIPLE SPINDLE INTERNAL GRINDERS



BAIRD AUTOMATIC HORIZONTAL AND VERTICAL MULTIPLE SPINDLE LATHES

about \$75,000 with equipment. Konrad Keil, 1215 Windsor Street, is architect.

Plymouth Industries, Inc., Plymouth, Ind., has been organized by Atholind A. Clizbe and J. Abner Droman, Plymouth, to manufacture stokers and parts, ice cream freezers and kindred products.

K. G. Schmidt Brewing Co., Inc., Logansport, Ind., has arranged for preferred stock issue totaling \$400,000, part of proceeds to be used for general expansion.

Chapman Price Steel Co., 3000 Shelby Street, Indianapolis, manufacturer of sheet and corrugated steel products, has reinstated normal working force of 500, increasing production schedule.

Kalamazoo Tank & Silo Co., Kalamazoo, Mich., manufacturer of tanks, silos, etc., plans rebuilding part of plant recently destroyed by fire. Loss about \$45,000 with equipment.

Menominee-Marquette Brewing Co., Menominee, Mich., has taken over former plant of United Beverage Co., and will remodel for new brewery. Cost about \$60,000 with machinery.

Colin B. Kennedy Co., West Grand Boulevard, Detroit, has been organized by Colin B. Kennedy and Herman C. Schultz, 17585 Wisconsin Avenue, and associates, to manufacture television and radio equipment and parts.

H. W. Rickel & Co., 1824 Adelaide Street, Detroit, have plans for one-story addition, 60 x 110 ft., for malt unit. Cost over \$50,000 with equipment. Galland-Henning Co., Milwaukee, is architect.

Manistee Brewing Co., Manistee, Mich., has plans for extensions and improvements, including new equipment. Cost over \$65,000 with machinery. Donald Lakie, Grand Rapids, Mich., is architect.

Grand Rapids Malleable Iron Works, Grand Rapids, Mich., is being improved and reconditioned for manufacture of railroad equipment. Operations will soon be resumed following shut-down for several months. Company is an interest of Chicago Railway Equipment Co., Chicago.

◀ MIDDLE WEST ▶

Marquette Brewing Co., Peoria, Ill., plans new five- and six-story plant, 135 x 550 ft., with two-story unit adjoining, 235 x 315 ft., for bottling, cooling and other service, with power house and machine shop. Site has been acquired. Cost over \$600,000 with equipment.

Owens-Illinois Glass Co., 965 Wall Street, Toledo, Ohio, plans rebuilding branch storage and distributing plant at Streator, Ill., recently destroyed by fire. Loss over \$80,000 with equipment.

Continental Brass Mfg. Co., Room 32-A, Waukegan Terminal Building, Waukegan, Ill., has been organized by Louis and Samuel Dulsky, to manufacture brass and bronze products.

Heiberg Brewing Co., Waverly, Iowa, care of William Heiberg, 545 Arlington Place, Chicago, president, has acquired former brewery at Waverly and will erect one-story addition and install additional equipment. Cost about \$80,000 with machinery. Fred Kienzie is plant superintendent.

Board of Public Works, Cedar Rapids, Iowa, plans installation of electric-operated pumping machinery, control and other mechanical equipment in new sewage disposal plant. Cost about \$400,000 with machinery. F. E. Young is city engineer. H. R. Green Co., 417 First Avenue, S. E., is consulting engineer.

Faribault Canning Co., Faribault, Minn., has awarded general contract to H. J. McCullough, Faribault, for one-story addition, 50 x 80 ft., to include installation of cooling tank, conveyors and other equipment. Ralph W. Richardson, New York Building, St. Paul, Minn., is engineer.

K. O. Lee & Sons, Aberdeen, S. D., manufacturers of motor tools, tractor accessories, parts, etc., have awarded general contract to Paul Steenberg Construction Co., First National Bank Building, St. Paul, for new two-story and basement plant, 126 x 182 ft., at Minneapolis, Minn., including machine shop, tool-making and assembling departments. Cost about \$80,000 with equipment. K. M. Fullerton, Shubert Building, St. Paul, is architect.

Bureau of Reclamation, Denver, asks bids until July 14 for one motor-driven vertical pumping unit, including motor, switchboard panel and accessories (Specification 596-D).

City Council, Shenandoah, Iowa, plans installation of pumping machinery and auxiliary equipment, filtration equipment, pipe lines, etc., for extensions in municipal water system. Cost about \$125,000. Allen & Vagt-

borg, 205 West Wacker Drive, Chicago, are consulting engineers.

Wisconsin Grey Iron Foundry Co., 4432 West Burnham Street, Milwaukee, will not rebuild foundry wrecked by fire in April, having leased plant at 7225 West Main Street, in West Allis, owned by J. I. Case Co., Racine, Wis., but not operated in recent years. Improvements are being made. Company specializes in high-strength alloy iron and semi-steel castings up to 15 tons. J. A. Burke is president and general manager.

City Water Commission, Baraboo, Wis., is taking bids until July 12 for one 3-ton hand traveling crane, complete with I-beam runway, rails and roller bearing geared trolley. F. M. Arndt is president of commission.

Oscar Mayer & Co., Chicago, will build addition, 45 x 60 ft., to boiler house of meat packing plant at Madison, Wis., at cost of \$50,000. Adolph C. Boltz is general manager at Madison.

Steelstamp Corp., 3879 North Richards Street, Milwaukee, has trebled working force and is operating 24 hr. a day on orders for more than 3,000,000 sets of hinges and locks for beer cases, also hardware stampings, for which there has been improved demand.

City Council, Kenosha, Wis., has plans by Alvord, Burdick & Howson, consulting engineers, 20 North Wacker Drive, Chicago, for new garbage incinerator plant to cost \$90,000. H. C. Laughlin is city manager.

◀ SOUTH CENTRAL ▶

Falls City Ice & Beverage Co., Broadway and Thirty-first Street, Louisville, has superstructure under way for new five-story plant, 100 x 150 ft., with power house, repair shop, and storage and distributing department. General contract recently let to Struck Construction Co., 147 North Clay Street. Cost over \$400,000 with equipment.

Belknap Hardware & Mfg. Co., 120 North Second Street, Louisville, plans rebuilding storage and distributing plant, recently damaged by fire. Loss about \$40,000 with equipment.

Nashville, Chattanooga & St. Louis Railway Co., Chattanooga, Tenn., plans rebuilding part of car repair shop at Nashville, Tenn., recently damaged by fire. Loss over \$30,000 with equipment.

City Council, Richmond, Ky., is considering erection of a municipal gas plant and system. Cost about \$100,000 with equipment, pipe lines, etc.

E. F. Griswold, Shreveport, La., operating local oil refinery plant, is planning erection of new refinery near Jackson, Miss. Cost over \$75,000 with equipment.

◀ SOUTHWEST ▶

Tulsa Brewing Co., Beacon Life Building, Tulsa, Okla., Saul A. Yager, head, is considering erection of new multi-story brewhouse, bottling and mechanical-cooling unit, with power house, machine shop and other structures. Cost over \$400,000 with equipment.

Purchasing Officer, Department of Interior, Washington, asks bids until July 13 for steam power plant for central heating service, with complete equipment and underground distribution system at Wheelock Academy, Millerton, Okla.

Sieloff Brine Sprays, Inc., St. Louis, has been organized by Emil Sieloff and Simon Zeitler, 5779 Waterman Street, to manufacture spraying equipment and devices.

City Council, Wellington, Kan., B. S. Lindberg, clerk, plans call for bids in August for electric-operated pumping machinery and auxiliary equipment, tanks, etc., for municipal sewage disposal plant. Cost about \$75,000 with equipment. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

Oklahoma Brewing Co., Oklahoma City, Okla., care of Harrison Smith, 711 North Broadway, head, is considering erection of new multi-story plant, with power house, machine shop and other mechanical units. Cost about \$450,000 with machinery.

Common Council, Pelley, Tex., plans installation of pumping machinery and other equipment for extensions and improvements in municipal waterworks. Financing for \$50,000 is being arranged.

◀ PACIFIC COAST ▶

Federated Metals Corp., 75 Folsom Street, San Francisco, has let general contract to Barrett & Hilt, 918 Harrison Street, for two-story addition, 40 x 50 ft., for storage and distributing. Ellison & Russell, Pacific Building, are architects.

National Safety Signal Corp., Los Angeles, care of Guthrie & Darling, Pacific Mutual Building, representatives, has been organized by F. A. Helman and C. H. Cunningham, Los Angeles, to manufacture signal equipment and devices.

Century Brewing Co., Seattle, has taken over two- and four-story brewery of Seattle Brewing & Malting Co., 3100 Airport Way, and will remodel for new plant. Cost about \$100,000 with machinery. Joseph Wohleb is company architect.

Southern Oregon Brewing Co., Medford, Ore., now being organized by George W. Porter, Medford, and associates, plans new brewery. Cost about \$100,000 with equipment.

Imperial Inter-Cities Water District, El Centro, Cal., plans erection of five electric-operated pumping plants for new water supply system for El Centro, Calexico, Imperial, Brawley and other points in Imperial Valley. Entire project with pipe lines, etc., will cost \$986,149, and financing is being arranged in that amount. Charles N. Perry, 732 North Heliotrope Drive, Los Angeles, is consulting engineer.

City Council, Salem, Ore., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., in connection with waterworks extensions and improvements. Cost about \$2,000,000. Baar & Cunningham, Spalding Building, Portland, are consulting engineers.

City Council, Bend, Ore., is planning municipal electric light and power plant. Cost about \$600,000 with equipment and distributing lines. Financing being arranged. C. G. Reiter, city manager, in charge.

◀ FOREIGN ▶

Ube Chisso Kogyo Kaisha, Ltd., city of Ube, Oita-Ken, Japan, recently organized by Y. Watanabe, city of Ube, head of a number of local industries, and associates, with capital of 5,000,000 yen (about \$1,260,000) is planning erection of new plant for production of ammonium sulphate. Company has secured rights to use Haber process for manufacture from Japan Artificial Fertilizer Co., Tokyo. Cost over \$500,000 with machinery.

Ministry of Commerce, Provincial Government of Kiangsi, Yungshin, China, has approved erection of new Government-owned paper mill for manufacture of special paper products, and will have plans drawn soon. Cost about \$350,000 with machinery.

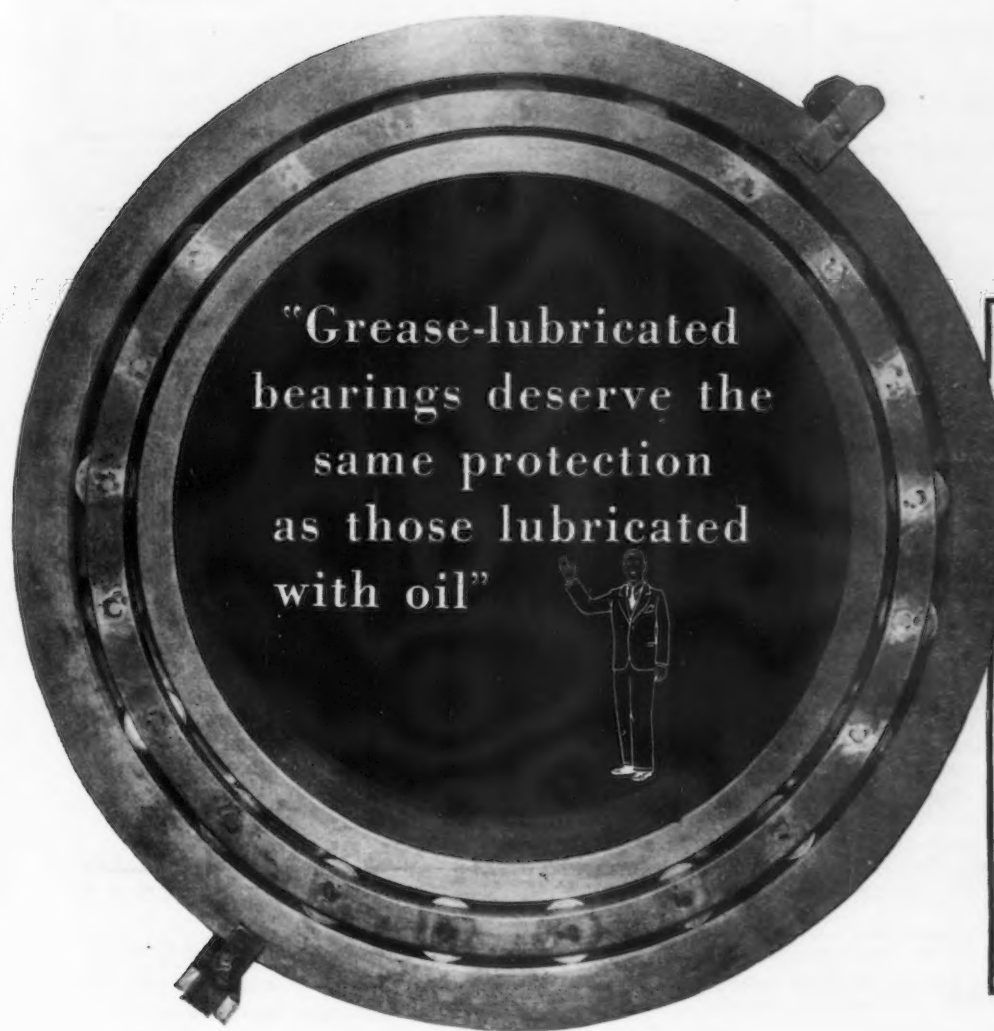
Compania Minera de San Rafael, Zacatecas, State of Zacatecas, Mexico, operating silver mining properties, has plans for a new smelting plant, to handle about 5000 tons of ore a day. Cost over \$400,000 with machinery.

Ministry of Commerce, Government of Turkey, Istanbul, Turkey, is arranging fund of \$16,500,000 for new railroad line from Filios mining district to new harbor at Ereğli on Black Sea. Work will include locomotive and steel car repair shops, coaling stations and other mechanical structures. Also proposed to develop coal fields to more than double present output of 1,500,000 tons a year.

Ministry of Communications and Public Works, Manzanillo, Mexico, plans extensions and improvements in waterworks, including installation of pumping machinery, steel tanks, filtration equipment, steel pipe lines, etc. Cost over \$75,000.

Homestead Valve Mfg. Co., Inc., Coraopolis, Pa., has appointed Clark-Wilcox Co., 790 Albany Street, Boston, exclusive representative in New England for its Hypresure Jenny vapor spray machine for cleaning industrial plants and buildings.

Keller Burs is the title of an illustrated 12 page booklet issued by Pratt & Whitney Co., Hartford, Conn. It describes the use of the various shapes and cuts of the burs manufactured by the company and used for die, pattern or production finishing and other uses.



Socony-Vacuum laboratories are constantly at work—improving lubricants for today's equipment—developing new lubricants for the equipment of tomorrow.

For instance, steam-engine builders recently improved designs—increased temperatures and pressures. Socony-Vacuum then brought out new Gargoyle Super Cylinder Oils which improve machine operation and lower costs in plants powered by steam engines.

Again—industry's recent low profit margins helped create a demand for lubricants that could further reduce frictional power consumption. Socony-Vacuum met *this* need with new Gargoyle Vactra X Oils, all-purpose lubricants that have cut power consumption in practically every plant in which they have been used.

Now Socony-Vacuum gives Industry the NEW Gargoyle Greases

After a long period of severe operating tests in both Europe and the United States—Socony-Vacuum offers the NEW Gargoyle Greases—products fully worthy of the Gargoyle name.

In the manufacture of Gargoyle Greases, former methods of grease production have been radically changed. Ingredients, formulae, temperatures and pressures are held under constant control. Each Gargoyle Grease is held closely to a definite standard, assuring uniform products—products that meet the exact service conditions for which

they are designed. In the new Gargoyle Greases you get the same high-grade oils — *the same dependable protection* — that you get in other Gargoyle Lubricants.

Any Socony-Vacuum representative will be glad to give you further information about Gargoyle Greases and other Gargoyle Lubricants — to suggest ways by which they can help lower today's costs in your plant.



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S O C O N Y - V A C U U M
C O R P O R A T I O N

MERGER OF STANDARD OIL COMPANY OF NEW YORK AND VACUUM OIL COMPANY

Modern Metallurgy—a Factor in the Jobbing Iron Foundry

(Concluded from Page 15)

pect to do so by simply adding a little alloy to his iron of today. Certain alloy additions will improve any iron, but modern metallurgy requires first a good high-strength base iron to which the alloy is added. In order to obtain this good high-strength base iron, it requires the standardized melting conditions referred to above, plus a thorough research, to determine the combination of materials available that work together for best results.

For example, what total carbons should be maintained? What silicon contents are most successful as related to the total carbon to give the best structure in heavy and light section castings, and then what is the correlation of these with the best manganese and phosphorus percentages? A thorough standardization of these items should be made as the first requisite for progress. Quick tests should be created to keep a constant check on the uniformity of the iron as the melting progresses, and the melting conditions should be varied or certain alloy additions should be made to maintain the standard specifications expected in the castings.

Winged Ingot Improves Structure of Steel

(Concluded from page 23)

Quite aside from the matter of center structure, the winged ingot improves melting practice by making it possible to pour in larger units. Where 18 small ingots, for instance, are made in the regular way, the first must be poured at a high temperature in order that the metal in the ladle does not cool down enough to cause freezing in the valve or nozzle before the eighteenth can be poured. These same 18 ingots could be made from six of the three-winged ingots, thus saving time and permitting a more uniform pouring temperature. In addition to the uniformity thus secured, the winged ingot has the advantage of materially reducing the amount of metal lost through cropping, as the discard is limited to the center section which weighs less than the amount ordinarily taken from the tops of three separate ingots. This center triangle goes back into the melt as scrap without having had any forging cost expended on it.

While the winged ingot process was developed to make more uniform tool steels, it appears to offer possibilities in the making of nearly all kinds of steel because of the unexpected economy in manufacture and the better

This article is not presented primarily to boost the wider use of expensive alloys. They have their place and help meet many problems. There are, however, other cheaper alloys that are the iron foundryman's friend which should not be forgotten. These are the alloys of manganese and silicon. A study of the effect of these on the basically good iron will lead the way to solving the requirements of many types of castings and give a flexibility of iron control essential to good jobbing casting practice that will meet a large percentage of the requirements efficiently.

The intelligent use of modern metallurgy in jobbing foundry work results from a careful study of the product under the microscope, constant checking of physical properties, constant records of casting service, and the accumulated experience based on these observations. It therefore takes time and patience to reach efficient standards and create prestige in the market. However, I am convinced the rewards of profit will go to the jobbing foundryman who works to these goals.

working qualities of the more homogeneous material.

Engineering Council Survey Discounts "Overproduction"

Inequality in the distribution of wealth and general overproduction cannot be arbitrarily blamed for the depression, according to the committee on the relation of consumption, production and distribution of the American Engineering Council, public service body of the engineering profession.

Calling for an increase in the average rate of production and consumption, the committee, in a report of a two-year study made public recently, declares that a survey of the scale of living of the majority of workers "dispels the idea that there has been general overproduction."

The committee, of which Ralph E. Flanders, Springfield, Vt., is chairman, believes that a better distribution—that is, more to classes now enjoying few or almost no goods—can be achieved without any substantial diminution in the share now obtained by those rendering useful services.

"A rise in the scale of living is physically possible of attainment to a

degree little comprehended by those unfamiliar with the available productive mechanisms, processes, and organizations," says the committee.

"Except in occasional and unimportant instances, these were not operating to their capacity during the peak of the last boom. The scale of living made possible by existing facilities and which is within easy reach, is that resulting from maximum production and not the mean of the variations of production."

The substitution of mechanical power for man-power is viewed as a favorable primary influence on raising the scale of living, although the committee points out that "as productive processes become more mechanized, more efficient, and less dependent on direct labor, dependence on the rewards for productive operations as the primary means of distributing goods becomes less automatic and certain."

War inflation, overinvestment, commercial banking policies, speculation, extreme variations in the price level, agricultural distress, heavy fixed charges in industry, and instalment buying are named by the committee as primary sources of business instability.

Welding in the Steel Industry

(Concluded from Page 17)

the bolts joining the end carriages and girders were welded in place.

In Fig. 5 is shown a 16-ton gear case built by the Southwark division of the Baldwin-Southwark Corp., Philadelphia, for a special machine used in an eastern steel mill. This case completely surrounds the gears, supports the shaft bearings and provides for an oil bath in which the gears run. The welded construction assures oil tightness.

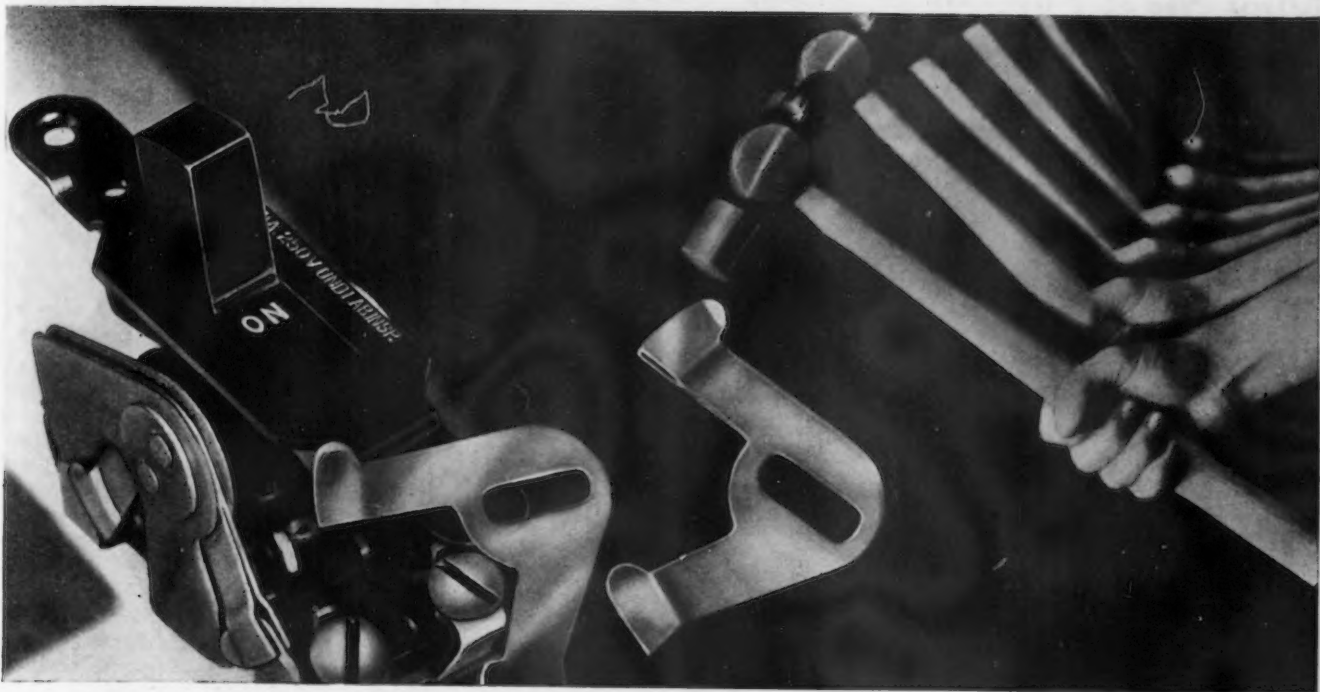
Side plates are 1½ in. thick and cover plates on either side 2 in. thick. Brackets and stiffeners are made of 1½ in. plates and fillet welded. The bosses and pads are steel forgings set into the cover plates and welded there by the shielded arc process. All welds were of the double-V type.

Steel Railroad Tie

(Concluded from Page 21)

on the bolts seat against retainers of drop-forged spring steel, the shape and material of the retainers serving in part to secure the desired resiliency in the rail anchoring.

The system includes also special rail joint bars that fit snugly against the fishing surfaces of the under side of the rail head and the upper side of the rail flange. Their design allows for an axial and end-for-end reversal.



A Fatigue Test Equivalent To THE IMPACT OF 100,000 HAMMERS!

FATIGUE tests of Phosphor Bronze switch contacts are extremely exacting. One customer of ours, whose motor control switch is shown above, demands an average of 125,000 make-and-break cycles before he is willing to approve the bronze.

The leaves must grip the tongue as firmly at the end of the test as they did at the beginning; for if connections become loose they will soon burn out. Seymour Phosphor Bronze spring stock was selected for these contacts because of its ability to "take it"!

In addition to plenty of resiliency to resist a "set," high conductivity must be insured by the presence of an accurate balance of copper. This is an outstand-

ing characteristic of spring contacts made of Seymour Phosphor Bronze.

Phosphor Bronze contact metal must also be so controlled in temper as to stand severe bending without fracture, yet retain all possible resiliency—properties well developed in Seymour Phosphor Bronze.

Because of its resistance to corrosion, particularly from salt water; negligible changeability under ordinary temperature rises; ability to withstand friction; and refusal to spark when struck, Seymour Phosphor Bronze is a problem-solver for a wide bracket of industries. May we send you test samples for one of your "trouble jobs"?



THE SEYMOUR MFG. CO., 24 FRANKLIN ST., SEYMOUR, CONN.

SEYMOUR
SHEETS, WIRE, RODS

PHOSPHOR BRONZE

ALSO: NICKEL SILVER SHEETS, WIRE, RODS : AND NICKEL ANODES

May Steel Exports Highest Since Oct. 1930—Imports Down

Exports of Iron and Steel from the United States
(In Gross Tons)

	May		Five Months Ended May	
	1933	1932	1933	1932
Pig iron	88	191	1,095	1,289
Ferromanganese and spiegeleisen	1	1	1	13
Scrap	89,328	45,000	290,523	93,758
Pig iron, ferroalloys and scrap	89,417	45,191	291,619	95,060
Ingots, blooms, billets, sheet bar	172	690	666	1,166
Skelp	1,102	4,200	2,092	10,976
Wire rods	532	1,048	4,914	8,535
Semi-finished steel	1,806	5,938	7,672	20,677
Steel bars	1,516	1,227	6,807	7,838
Alloy steel bars	197	161	542	834
Iron bars	32	84	161	238
Plates, iron and steel	881	875	2,192	6,088
Sheets, galvanized steel	2,958	2,194	11,690	12,520
Sheets, galvanized iron	134	98	276	645
Sheets, black steel	2,290	5,091	10,657	18,557
Sheets, black iron	104	296	638	1,538
Hoops, bands, strip steel	1,706	2,208	6,460	10,281
Tin plate:terne plate	4,189	2,212	18,422	16,695
Structural shapes, plain material	686	1,285	2,975	7,186
Structural material, fabricated	1,568	1,357	5,187	6,272
Tanks, steel	7	72	727	1,247
Steel rails	1,362	1,171	6,577	6,267
Rail fastenings, switches, frogs, etc.	171	256	988	2,062
Boiler tubes	251	115	1,662	1,053
Casing and oil-line pipe	4,858	3,428	17,167	13,756
Pipe, black and galvanized, welded steel	1,747	1,449	5,486	6,650
Pipe, black and galvanized, welded iron	12	134	126	290
Plain wire	889	696	2,917	4,960
Barbed wire and woven wire fencing	2,735	1,732	8,224	9,254
Wire cloth and screening	37	67	220	277
Wire rope	112	135	677	769
Wire nails	668	496	2,661	3,570
Other nails and tacks	320	316	1,395	1,708
Horseshoes	2	1	32	29
Bolts, nuts, rivets and washers, except track ..	264	205	1,284	1,183
Rolled and finished steel	29,696	27,361	116,150	141,767
Cast iron pipe and fittings	878	440	2,647	4,747
Malleable iron screwed fittings	193	245	771	788
Car wheels and axles	222	285	1,906	1,456
Iron castings	97	242	907	899
Steel castings	48	151	271	624
Forgings	403	290	1,362	1,955
Castings and forgings	1,341	1,653	7,864	10,469
All other	309	314	1,382	1,668
Total	123,069	80,457	424,687	269,641

Imports of Iron and Steel Products into the United States
(In Gross Tons)

	May		Five Months Ended May	
	1933	1932	1933	1932
Pig iron	9,548	16,819	51,597	60,599
Sponge iron	52	115	115	51
Ferromanganese and spiegeleisen*	3,811	3,047	12,536	10,947
Ferrosilicon†	12	21	21	101
Other ferroalloys	100	1	1	639
Scrap	4,370	1,950	5,426	3,958
Pig iron, ferroalloys and scrap	17,781	21,950	69,700	76,327
Steel ingots, blooms, billets, etc.	17	34	109	2,017
Wire rods	961	388	4,634	3,466
Semi-finished steel	978	422	4,743	5,483
Concrete reinforcing bars	371	4,508	1,272	15,960
Hollow steel bars	57	54	383	329
Merchant steel bars	1,099	2,076	7,032	15,933
Iron bars	77	22	149	256
Iron slabs	27	9	109	95
Boiler and other plate	417	1,975	4,550	9,356
Sheets, skelp and saw plate	21	392	182	7,148
Tin plate	2,113	2,905	9,471	15,295
Structural shapes	312	513	706	1,673
Rails and rail fastenings	243	252	1,422	2,000
Welded pipe	80	382	504	1,417
Other pipe	445	909	4,517	6,575
Barbed wire	137	183	1,129	996
Round iron and steel wire	87	85	329	367
Flat wire and strip steel	117	217	642	833
Wire rope and strand	108	74	789	369
Other wire	1,131	1,989	6,435	9,262
Hoops and bands	485	751	2,993	4,273
Nails, tacks and staples	34	10	123	65
Bolts, nuts and rivets	25	1	142	25
Rolled and finished steel	7,386	17,307	42,974	92,227
Cast iron pipe and fittings	87	23	315	23
Castings and forgings	63	72	378	448
Total	26,295	39,751	118,110	174,508

*Manganese content only.
†Chromium content only.
‡Silicon content only.

WASHINGTON, June 27.—Totaling 123,069 gross tons, exports of iron and steel products in May, 1933, were the highest for any month since October, 1930, when they were 131,845 tons. The large increase in May shipments, representing a gain of 22,674 tons over April exports, was accounted for by the scrap movement, aggregating 89,328 tons, of which 73,516 tons went to Japan, 7565 tons to Italy and 4952 tons to Poland and Danzig.

Imports in May declined to 26,295 tons from 28,061 tons in April.

Eliminating scrap, exports in May reflected a gain of 7065 tons over those of April. Gains were made in barbed wire, welded galvanized steel pipe, galvanized steel sheets and frames, sashes and sheet piling.

Exports in the first five months of 1933 totaled 424,687 tons or 156,046 tons over those of the corresponding period of last year. Scrap shipments rose to 290,523 tons from 93,758 tons.

Imports in the first five months of 1933 aggregated 118,110 tons compared with 174,508 tons in the corresponding period of last year. The most marked decreases were made in reinforcement bars, pig iron, merchant steel bars, structural shapes and sheets.

Japan was the largest market for American iron and steel products in May, taking 75,535 tons, made up almost entirely of scrap.

With shipments of 4311 tons of scrap and 2096 tons of ferromanganese, Canada led with a total of 6946 tons in supplying May imports to the United States.

United States Imports of Pig Iron
by Countries of Shipment

	May		Five Months Ended May	
	1933	1932	1933	1932
United Kingdom	4,050	5,718	5,000	10,318
British India	3,290	4,019	23,721	19,391
Germany	100	234	135	185
Netherlands	1,683	7,077	17,367	29,577
Canada	425	844	138	138
France	200	200	200	200
Belgium	200	200	200	200
Norway	200	200	200	200
Sweden	200	200	200	200
Other countries	200	200	200	200
Total	9,548	16,819	51,597	60,599

Sources of American Imports
of Iron Ore

	May		Five Months Ended May	
	1933	1932	1933	1932
Canada	430	728	728	728
Cuba	11,000	33,150	55,000	55,000
Chile	43,304	175,188	175,188	175,188
Spain	49	49	49	49
Sweden	7,037	7,037	7,037	7,037
French Africa	3,625	10,000	10,000	10,000
Russia	9,650	15,900	40,650	81,610
Other countries	16,845	21,953	52,574	52,574
Total	20,650	80,104	95,753	382,186

BASOLIT PICKLING TANKS

U. S. PATENT



QUALITY, SERVICE, SUCCESS

Over two years ago the Canada Wire & Cable Co., Ltd., installed this Basolit Pickling Tank at their Montreal East plant. It is used for pickling black copper rods, and has a capacity of 500 tons per 10-hour shift. Dilute sulphuric acid is the pickling agent.

The company states, "Up to the present time we have not had any occasion to repair any portion of this tank so that our maintenance cost has been negligible."

Sulphuric, muriatic, nitric and all commercial acids fail to attack the leak-proof and wear-proof qualities of Basolit pickling tanks.

BASOLIT TANKS ARE GUARANTEED

Write us and get rid of Pickling Tank troubles

NEW YORK • **NUKEM PRODUCTS CORP.**, 68 Niagara St., Buffalo, N.Y. • TORONTO, ONT. LOS ANGELES
PITTSBURGH

Prima Installs "IngOclad" Beer Measuring Tanks

Stainless clad steel was the material selected for three 150 barrel government measuring tanks for the Prima Co. of Chicago. This represents one of the first major installations of this comparatively new material for breweries. It further illustrates the brewmaster's confidence in the properties of the stainless clad steel, with its inner surface of stainless steel bonded to an outer foundation of mild steel.

These tanks were field constructed and welded throughout. The walls are of $\frac{1}{4}$ in. IngOclad, and the heads of 5/16 in. IngOclad, both having a 20 per cent thickness of 18-8 stainless steel on the inside. Stainless steel welding rod was used for all welded seams.

IngOclad material is produced by the Ingersoll Steel & Disc Co., a division of the Borg-Warner Corp., Chicago, under a patented ingot process.

Bureau of Mines Reports May Coke Production Up

Production of coke during May increased sharply over that for April, reflecting the marked improvement in the iron and steel industry. The total output of both by-product and beehive coke amounted to 1,968,557 tons, or 63,728 tons per working day. This represents an increase of 11.6 per cent in comparison with the daily rate prevailing in April.

The output of by-product coke amounted to 1,921,257 tons, or 61,976 tons per day, as compared with the daily rate of 55,206 tons in the preceding month, and 56,210 tons in May,

1932. The daily average of pig iron production increased 37.7 per cent during the month; responding to this increased activity, the daily rate of coke production at furnace plants increased from 28,459 tons in April to 34,947 tons in May, or 22.8 per cent. On the other hand, the daily rate at merchant plants increased only 1.1 per cent. The total output of beehive coke during May (47,300 tons) was virtually the same as in April.

Stocks at by-product plants increased from 2,847,155 tons to 2,975,172 tons, or 4.5 per cent, with most of the increase occurring at merchant plants. Stocks at the end of the month were equivalent to 48 days' production at the current rate, as compared with 51.6 days' at the end of April.

An Expanding Use of Copper-Nickel

The recent award by the United States Navy of contracts for 350,000 lb. of nickel-copper condenser tubes for a cruiser and six destroyers serves to draw attention to the wide acceptance tubes of this material have been gaining in the past decade. A review of some of the notable applications tells the story.

The first commercially made tubes of the 80-20 copper-nickel composition, 200 in number, were supplied in 1922, it is believed, for the North Tees power station of the Newcastle-upon-Tyne Electric Supply Co., Ltd., England. Since then marine condensers have accounted for the bulk of the consumption. Ship installations include the following:

The Melita and the Minnedosa of the Canadian Pacific Steamships, Ltd., were completely equipped with copper-nickel condenser tubes in 1926 and the tubes are still in service. Practically

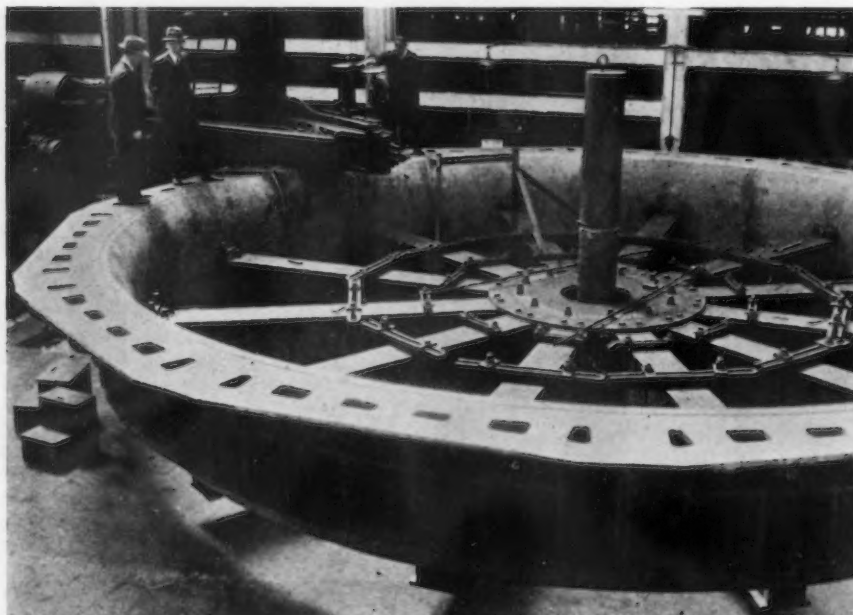
the whole fleet is now so fitted including the latest liner of the company, the Empress of Britain.

The recently commissioned liners Manhattan and Washington of the United States Lines carry 100,000 lb. of tubes each. The new French steamships Champlain and Atlantique and the new Italian super-liners Rex and Conte di Savoia also have full copper-nickel tube equipment. Substantially 200,000 lb. of the tubes were required for each of the Italian ships. Meanwhile the navies of the principal countries have gone in heavily for condenser tubes of the copper-nickel alloy.

Canadian Auto Production Highest In Two Years

Production of 9396 motor vehicles in Canada during May was the highest output reported for any month since May, 1931, when 12,738 cars were made. The advance this month was the third gain in succession made during the current year. March output was 101 per cent over that of February; April 24 per cent over that of March, and May 14 per cent greater than April's output. The principal increase over the preceding month was in the output of passenger cars which rose to 8024 from 6957, while trucks also showed some improvement at 1372 as against 1298 in April.

During May, 7167 cars were made for sale in Canada, leaving a balance of 2229 intended for export. The apparent consumption of cars in Canada during the month, as determined by adding the 7167 cars made for sale in Canada to the 159 imported, amounted to 7326 cars. For the five months ended May, 30,939 cars were produced in Canada, 771 were imported and 6415 were exported.



BOULDER DAM machinery begins to take form in the shops of the Westinghouse Electric & Mfg. Co. as machinists prepare to "face off" the throat liners of the dam's huge penstocks. This large steel casting weighs 40 tons, is 36 ft. in outside diameter and requires 2 min. to rotate one complete revolution. The tool in the left background makes the desired cut in the face of the casting. Later, 912 holes will be drilled through the 2-in. thick steel. Ten days are required for this operation on the boring machine which had to be improvised to accommodate the casting's unusually large size.

THE IRON AGE

PRODUCTION -- MANAGEMENT

JULY 13, 1933

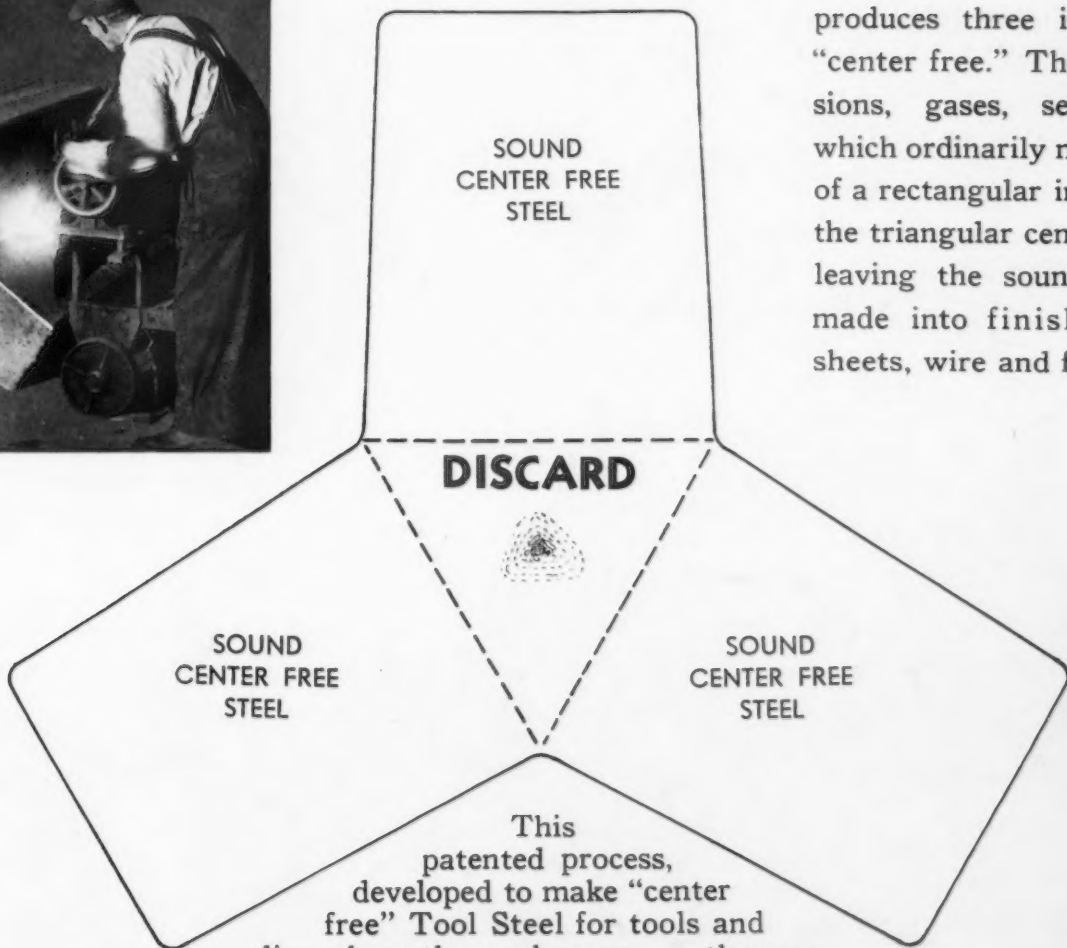
PROCESSES -- NEWS

ANNOUNCING—

A NEW STEP IN METALLURGICAL PROGRESS

used in making Firth-Sterling Tool Steels

THE FIRTH "WINGED" INGOT



produces three ingots which are "center free." The porosity, inclusions, gases, segregations, etc., which ordinarily move to the center of a rectangular ingot are found in the triangular center and scrapped, leaving the soundest steel to be made into finished bars, strip, sheets, wire and forgings.

This patented process, developed to make "center free" Tool Steel for tools and dies where the work comes on the center of the bar, is now found useful wherever greater uniformity and soundness are desired.

Details will be sent upon request.



FIRTH-STERLING STEEL COMPANY

GENERAL OFFICE AND WORKS
McKEESPORT, PA.
BRANCH OFFICES AND WAREHOUSES:
NEW YORK CHICAGO
HARTFORD CLEVELAND
DETROIT PHILADELPHIA
LOS ANGELES

About this FLEXIBILITY —

Flexible: Responsive to, or readily adjustable to meet the requirements of changing conditions. (Webster's International).

Today's conditions require greater Flexibility of Tooling, of Operation, and of Application of machine tools to meet the constantly changing requirements of redesigned parts, varied production schedules and volume.

Bullard Single Spindle Automatic VERTICAL LATHE provides:

Rigid, simplified Universal Standard Tooling.

Quick tool "change-over" and "set-up" for short run jobs or quick and economical "change-over" to meet changes in work design.

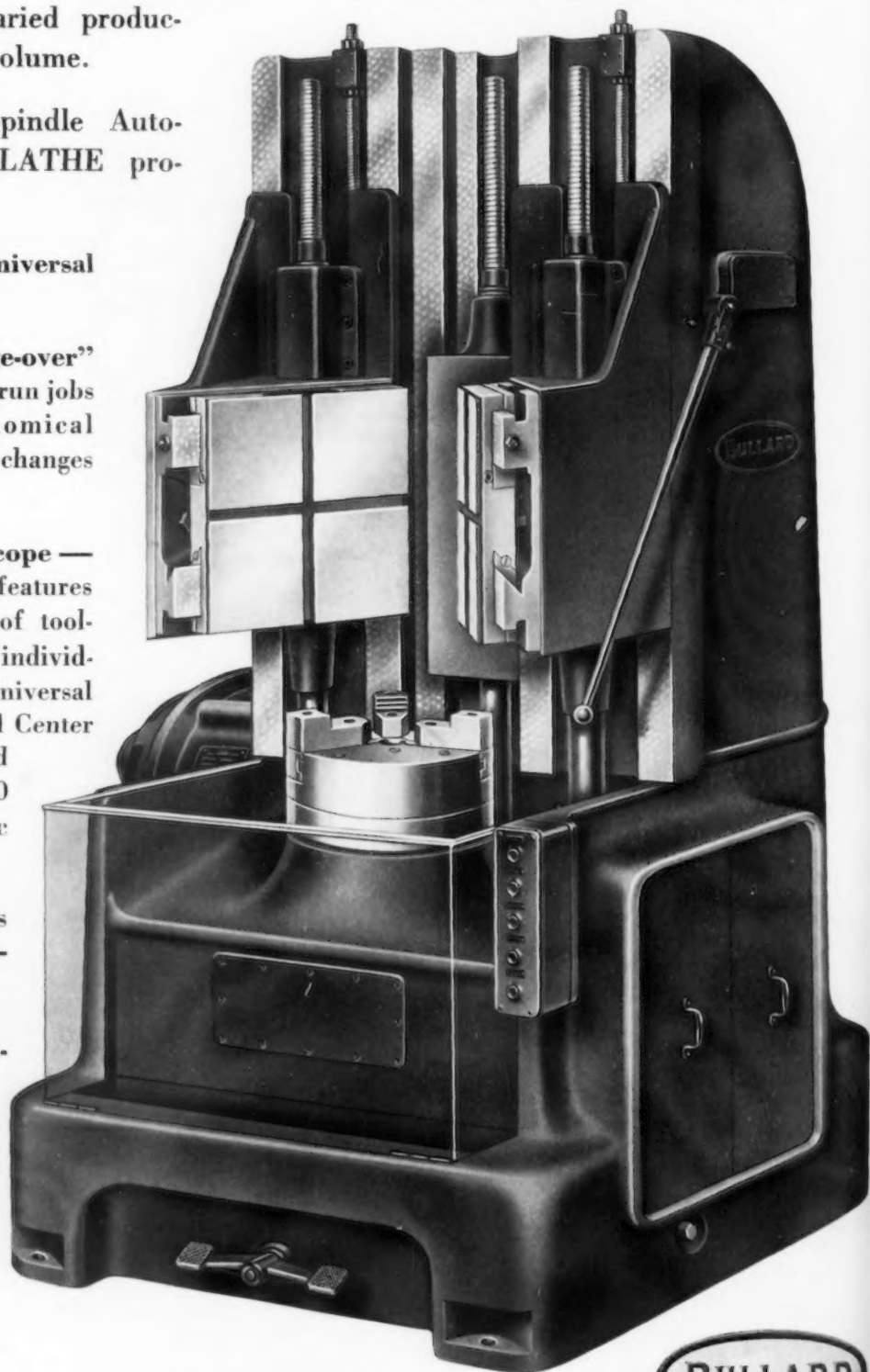
Broad operating scope — Automatic with basic features allied with flexibility of tooling—80 feed changes individual for each of two Universal Heads and one Vertical Center Head. Also 80 speed changes up to 800 R.P.M. with automatic change during cuts.

Screw Feed Works for ideal threading—20" stroke.

Tail Stock application.

Before deciding your Equipment purchase, compare Bullard Automatic VERTICAL LATHE features.

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Service is yours
for the asking.**



**SINGLE SPINDLE
AUTOMATIC VERTICAL LATHE**

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